CONTRACT SERIAL NO.
23440-8-9176-01-SS
Appendix 3
Part II

CONTRACTOR: LAVAL UNIVERSITY

[redacted]

DÉPARTEMENT DE GÉNIE CHIMIQUE

UNIVERSITÉ LAVAL

QUÉBEC, QUÉ., CANADA, G1K 7P4

91-06112/

QUANTITATION OF XPS INTENSITY RATIOS FOR SUPPORTED CATALYSTS

Final Report

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Project conducted for the
Canada Centre for Mineral and
Energy Technology
Energy, Mines and Resources Canada

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Project No. (CANMET) 23440-8-9176

CANMET Scientific Authority: Dr. James R. Brown

Department of Chemical Engineering
Université Laval

November 1990

QUANTITATION OF XPS INTENSITY RATIOS

FOR SUPPORTED CATALYSTS

APPENDIX 3

PART II

XPS SPECTRA

ZEOLITE-SUPPORTED PALLADIUM CATALYSTS

138 pp

MICROMEDIA

CONTENTS

Sample	Identification	Pretreatment	Spectra No.
142A	3% Pd/HZSM-5(A)[a]	calcined	ASA 2
		reduced	ASA 3
		red.grnd[b]	ASA 4
142B	2.43% Pd/HZSM-5(B)[a]	calcined	ASA 15
		red.grnd[b]	ASA 23 (survey)
			ASA 13
151A	2.93% Pd/HZSM-5(A)[c]	calcined	ASA 7
		reduced	ASA 10
		red.grnd[b]	ASA 8
151B	2.98% Pd/HZSM-5(B)[c]	calcined	ASA 18
		calcined	ASA 29 (check)
		reduced	ASA 17
		reduced	ASA 26 (check)
		red.grnd[b]	ASA 25 (survey)
180	3% Pd/HZSM-5(A)[c]	calcined	ASA 32
		cal.grnd[d]	ASA 33
		reduced	ASA 50
		red.grnd[b]	ASA 51

(a) prepared by ion-exchange, (b) reduced, then ground, (c) prepared by gas phase adsorption and decomposition, (d) calcined, then ground.

Pd/HZSM-5(A)

Sample No. 142A (3.00% Pd)

Prepared by ion-exchange

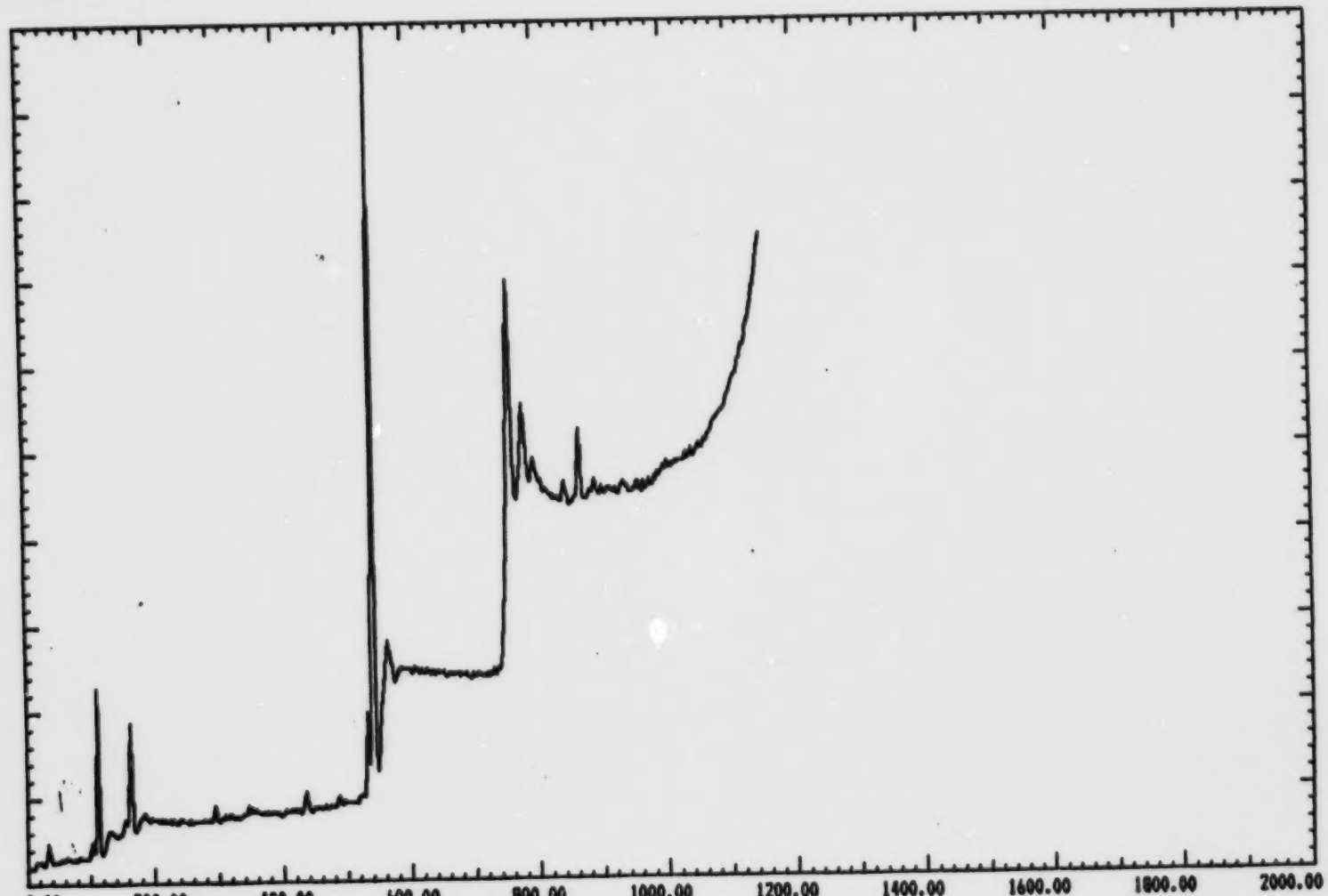
Pd/HZSM-5(A)

Sample No. 142A (3.00% Pd)

CALCINED

ASA2 Region 1 SURVEY VG SCIENTIFIC

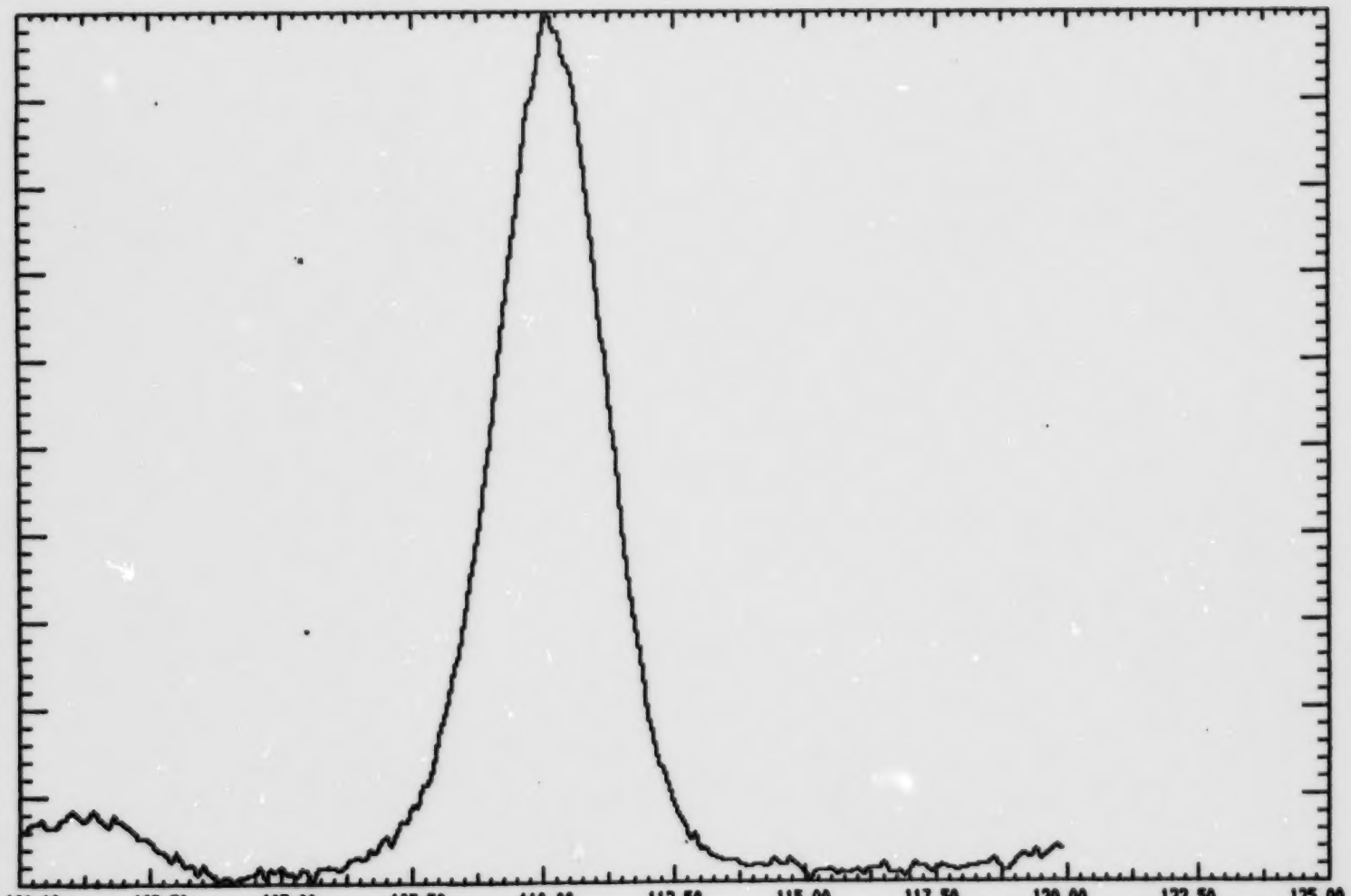
Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 111382
Step Size = 1.00 eV. 7 Scans of 1150 channels at 50 ms per chan



AS. GL-2-142-A CM POS.XPS C1 15D/H
MG300 NR
23 NOV.89 12H20

ASA2 Region 2 SI2P VG SCIENTIFIC

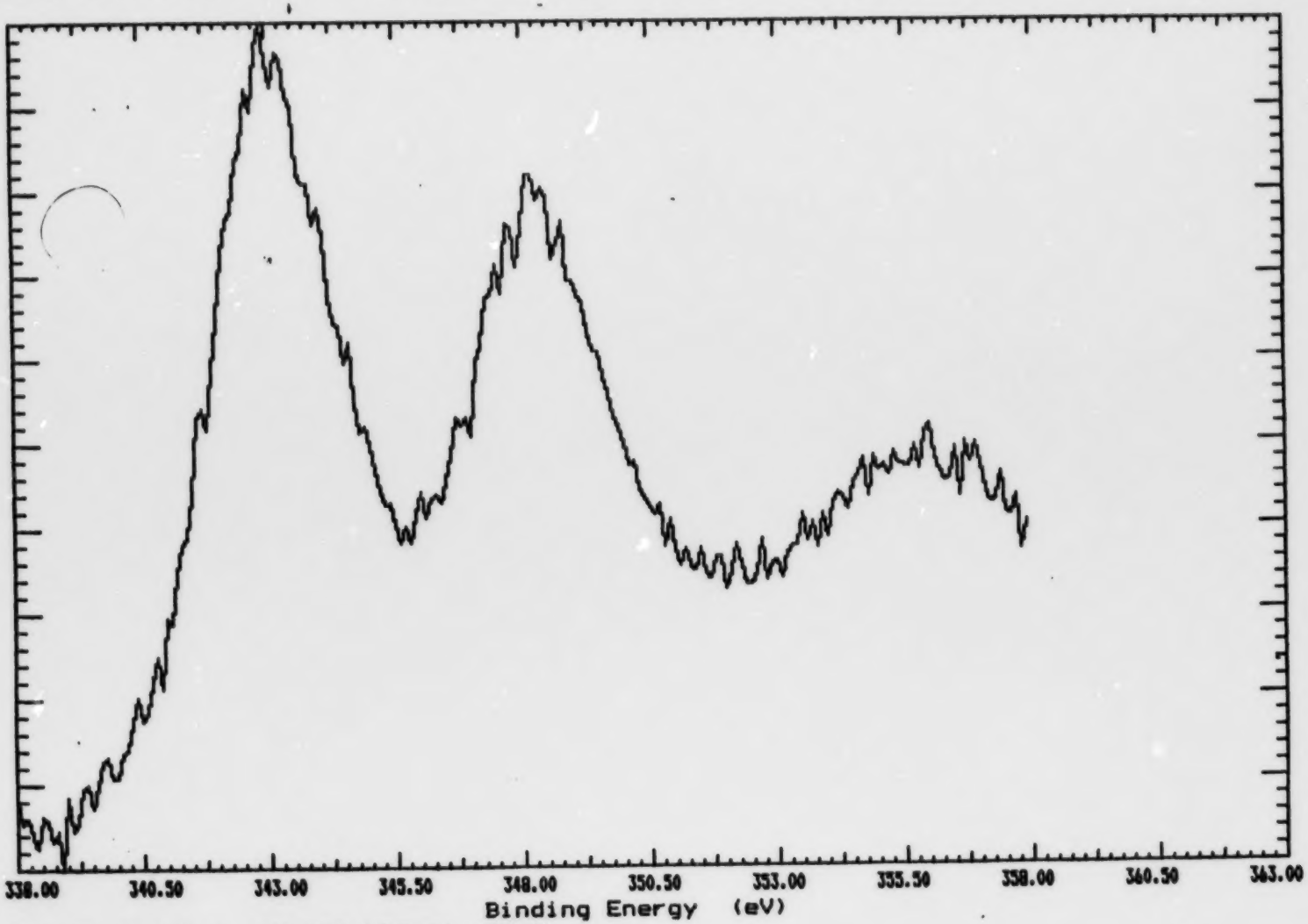
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 5167
Step Size = 0.10 eV. 30 Scans of 200 channels at 50 ms per chan



A8. GL-2-142-A CM POS.XPS C1 15D/H
MG300 NR
23 NOV.89 12H20

ASA2 Region 3 PD3D VG SCIENTIFIC

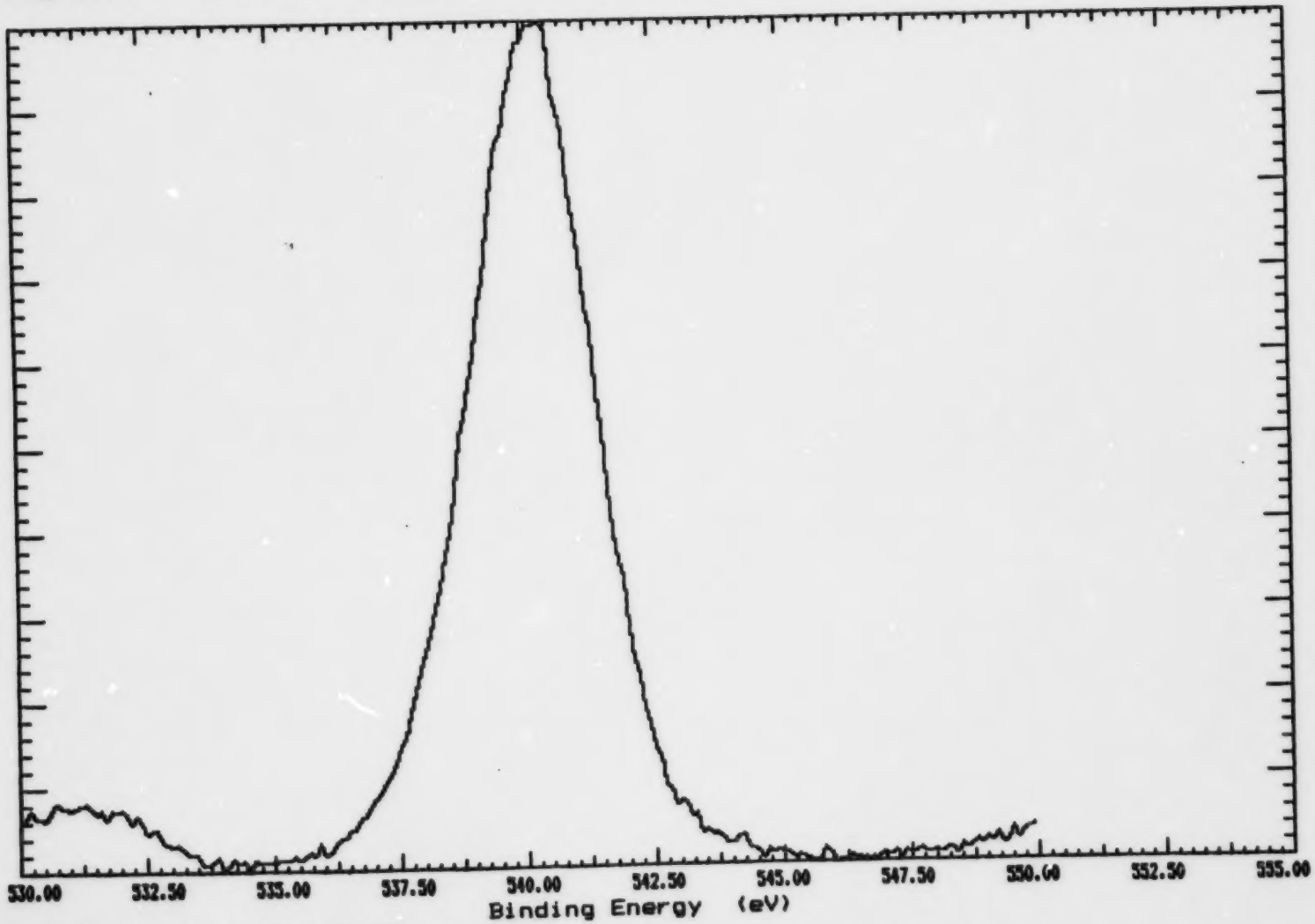
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 322
Step Size = 0.10 eV. 862 Scans of 200 channels at 50 ms per chan



AS. GL-2-142-A CM POS.XPS C1 15D/H
MG300 NR
23 NOV.89 12H20

ASA2 Region 4 O1S VG SCIENTIFIC

Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 24435
Step Size = 0.10 eV. 5 Scans of 200 channels at 50 ms per chan

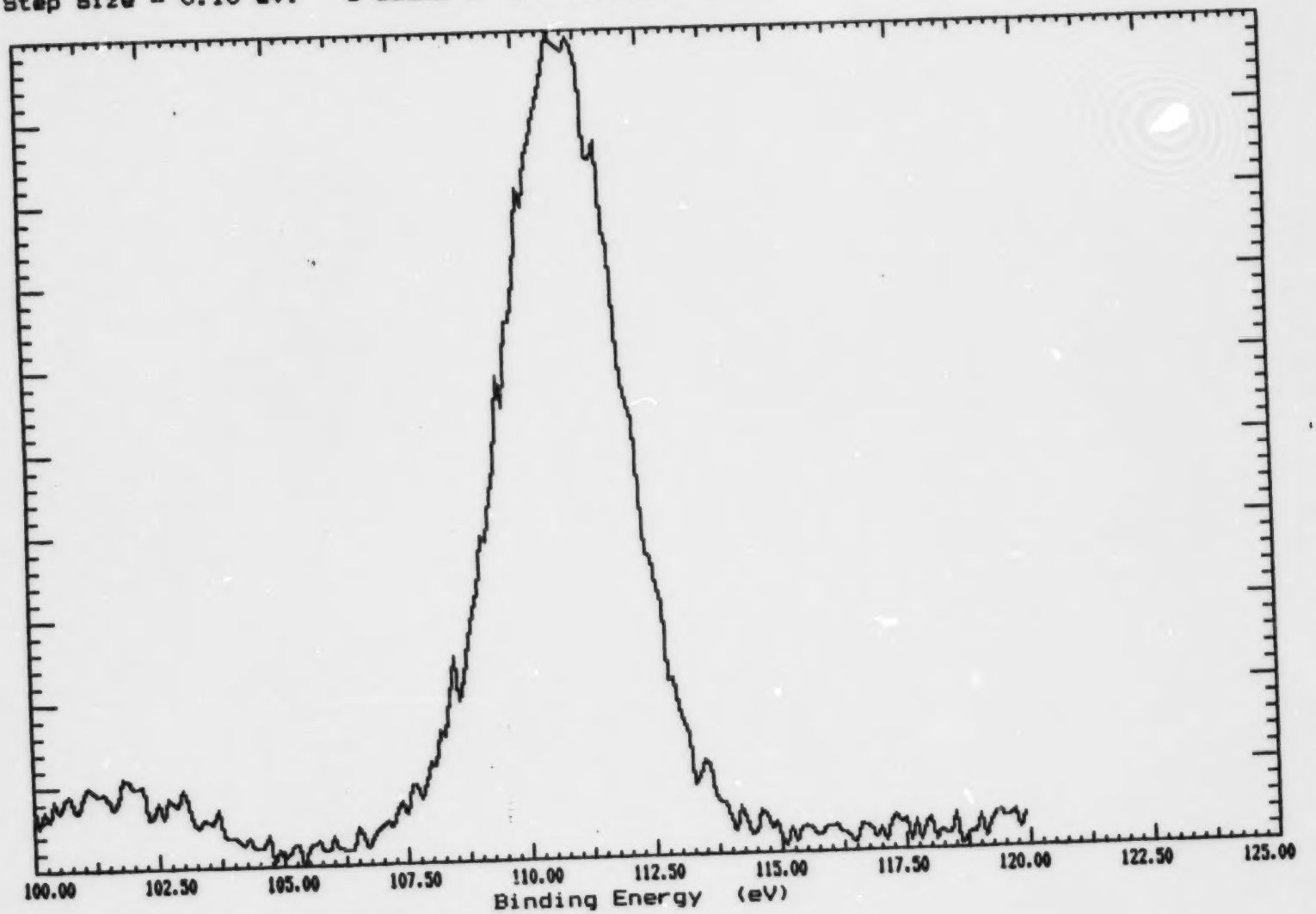


AS. GL-2-142-A CM POS.XPS C1 15D/H
MG300 NR
23 NOV.89 12H20

ASA2 Region 5 SI2P

VG SCIENTIFIC

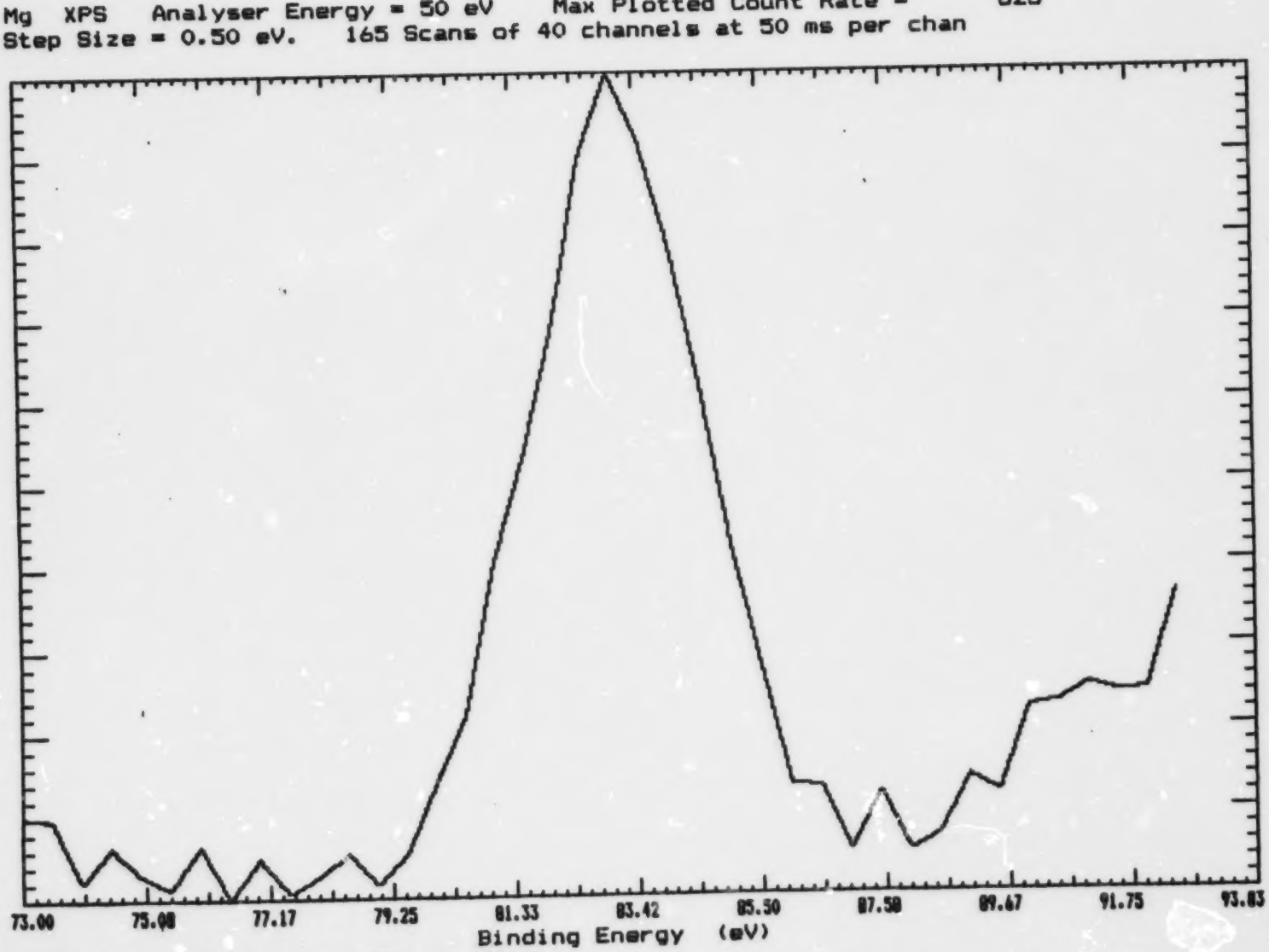
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 4671
Step Size = 0.10 eV. 5 Scans of 200 channels at 50 ms per chan



AS. GL-2-142-A CM POS.XPS C1 15D/H
MG300 NR
23 NOV.89 12H20

ASA2 Region 6 AL2P VG SCIENTIFIC

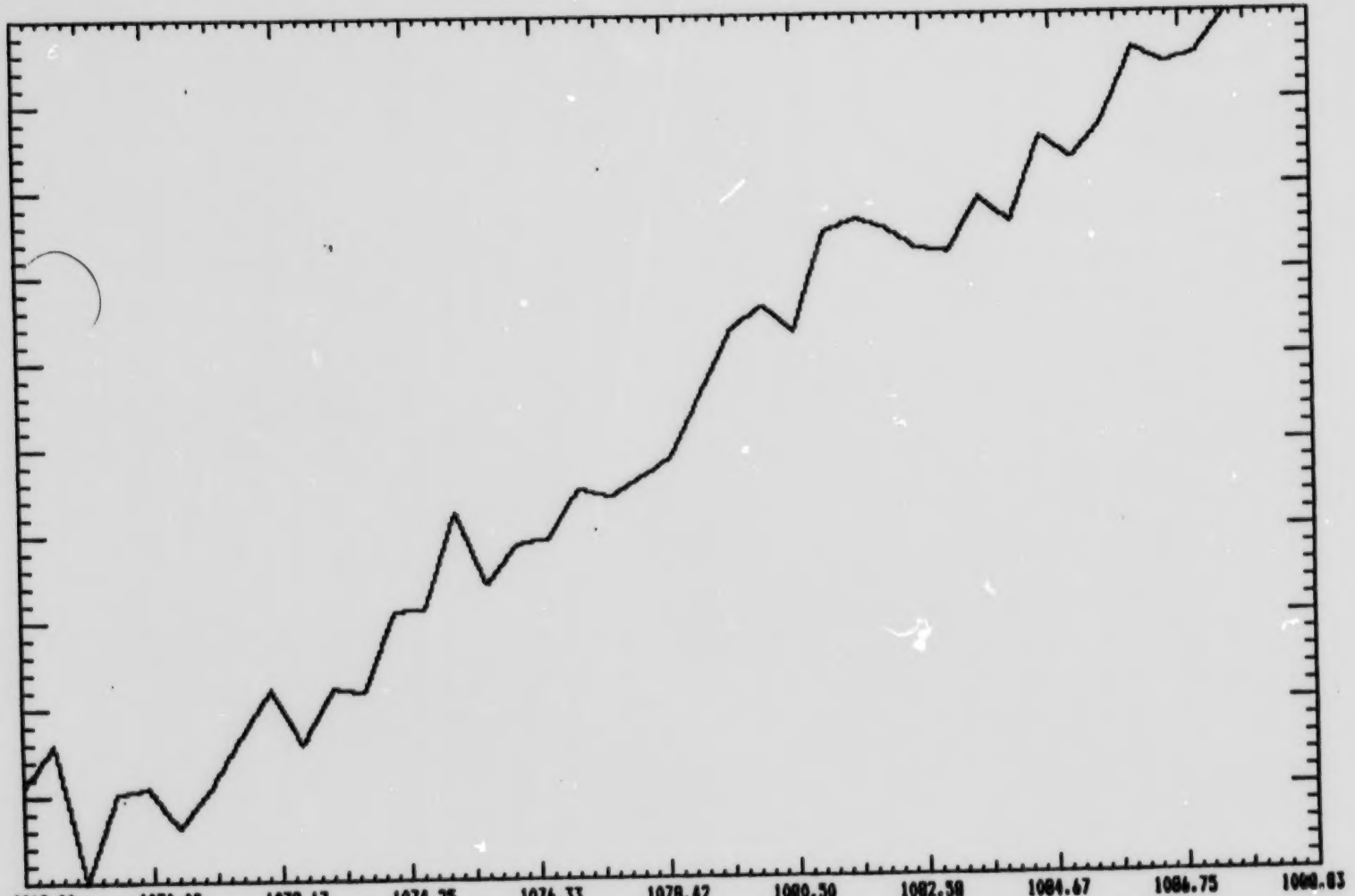
Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 625
Step Size = 0.50 eV. 165 Scans of 40 channels at 50 ms per chan



AB. BL-2-142-A CM POS.XPS C1 15D/H
MG300 NR
23 NOV.89 12H20

ASA2 Region 7 NA16 VG SCIENTIFIC

Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 3049
Step Size = 0.50 eV. 100 Scans of 40 channels at 50 ms per chan



AS. GL-2-142-A CM POS.XPS C1 15D/H
MG300 NR
23 NOV.89 12H20

Pd/HZSM-5(A)

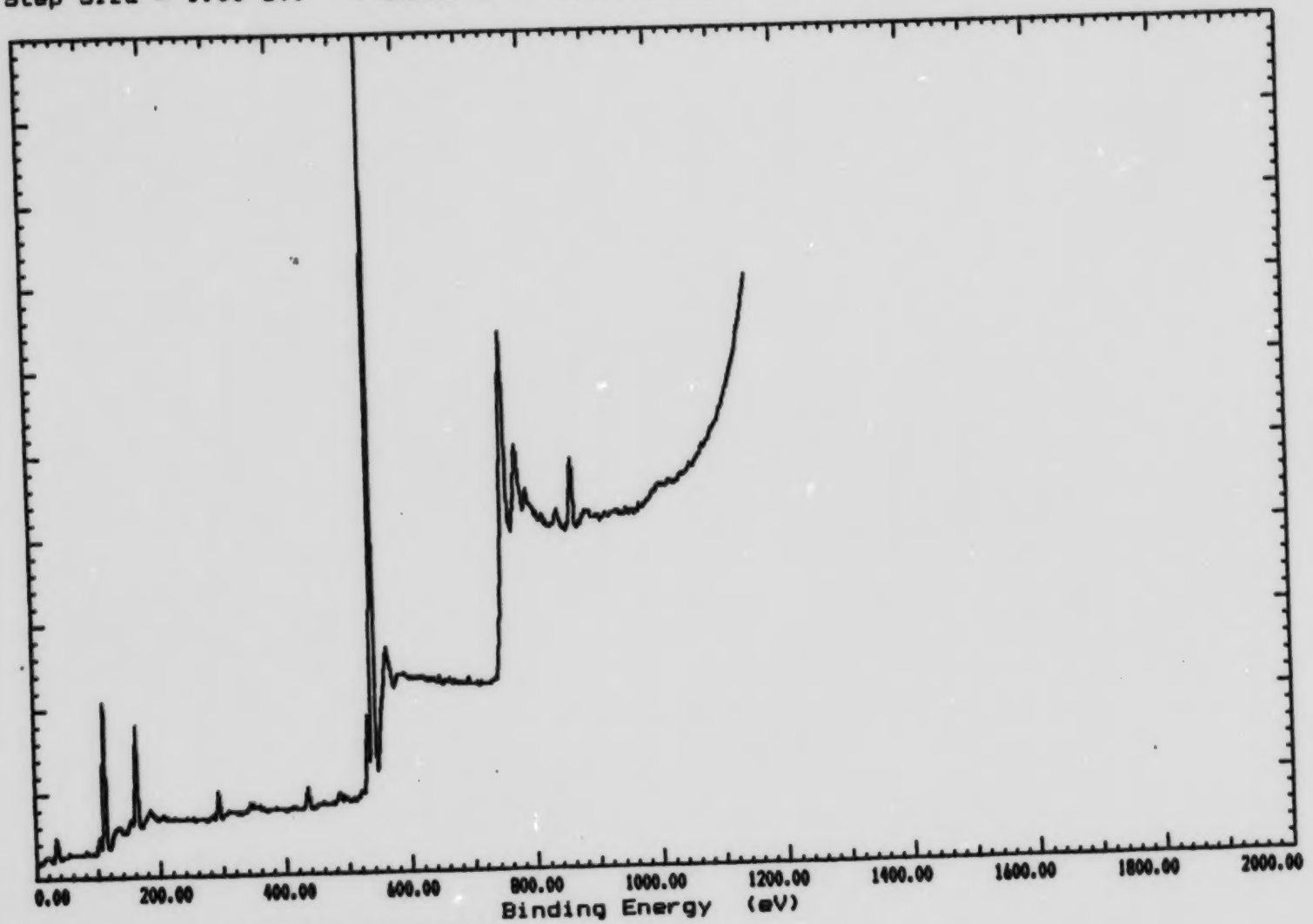
Sample No. 142A (3.00% Pd)

REDUCED

ASA3 Region 1 SURVEY

VG SCIENTIFIC

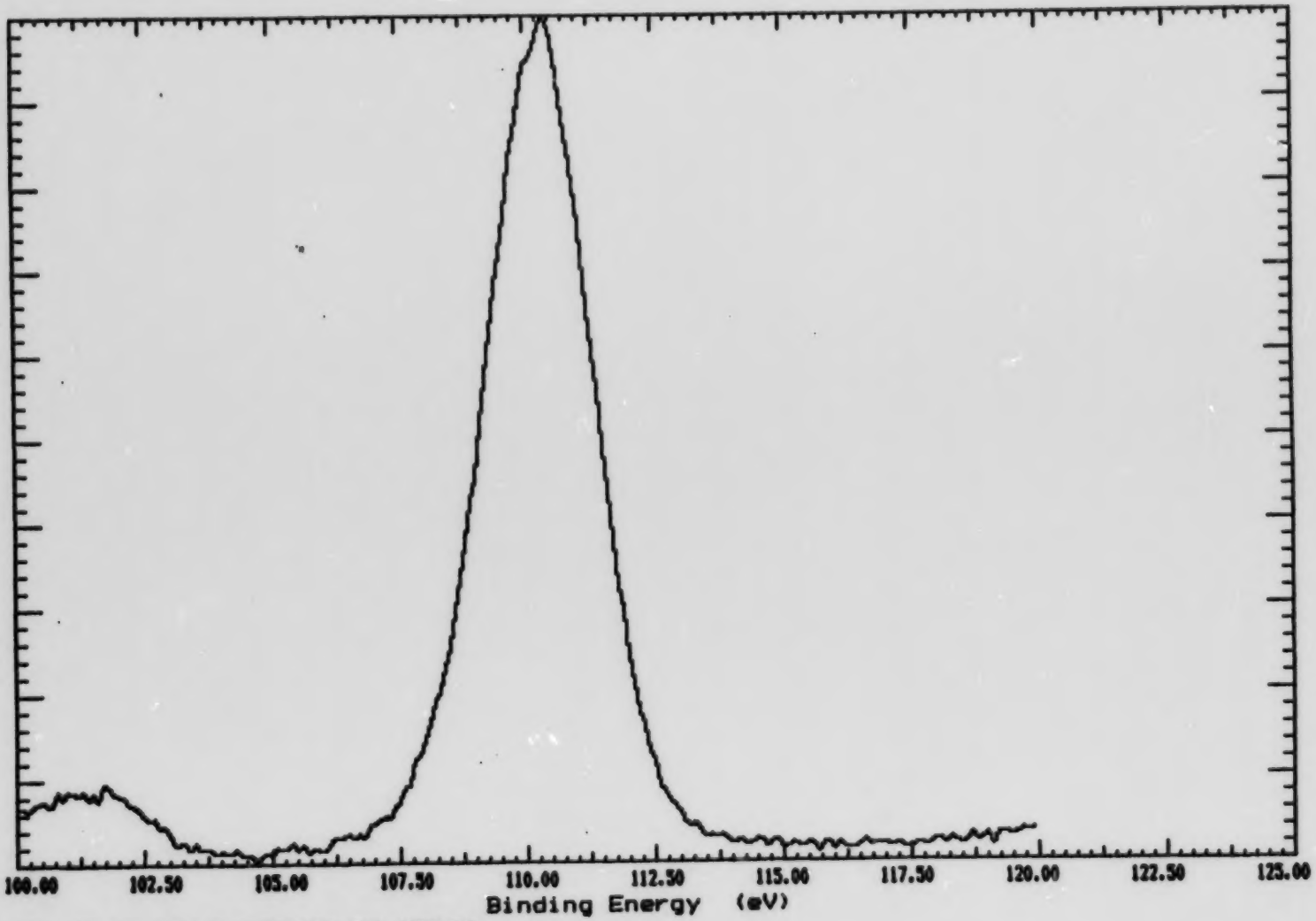
Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 155754
Step Size = 1.00 eV. 7 Scans of 1150 channels at 50 ms per chan



AS. GL-4-142-A-REDUIT CM 15D/H
MB300 NR
23 NOV.89 16H45

ASA3 Region 2 SI2P VG SCIENTIFIC

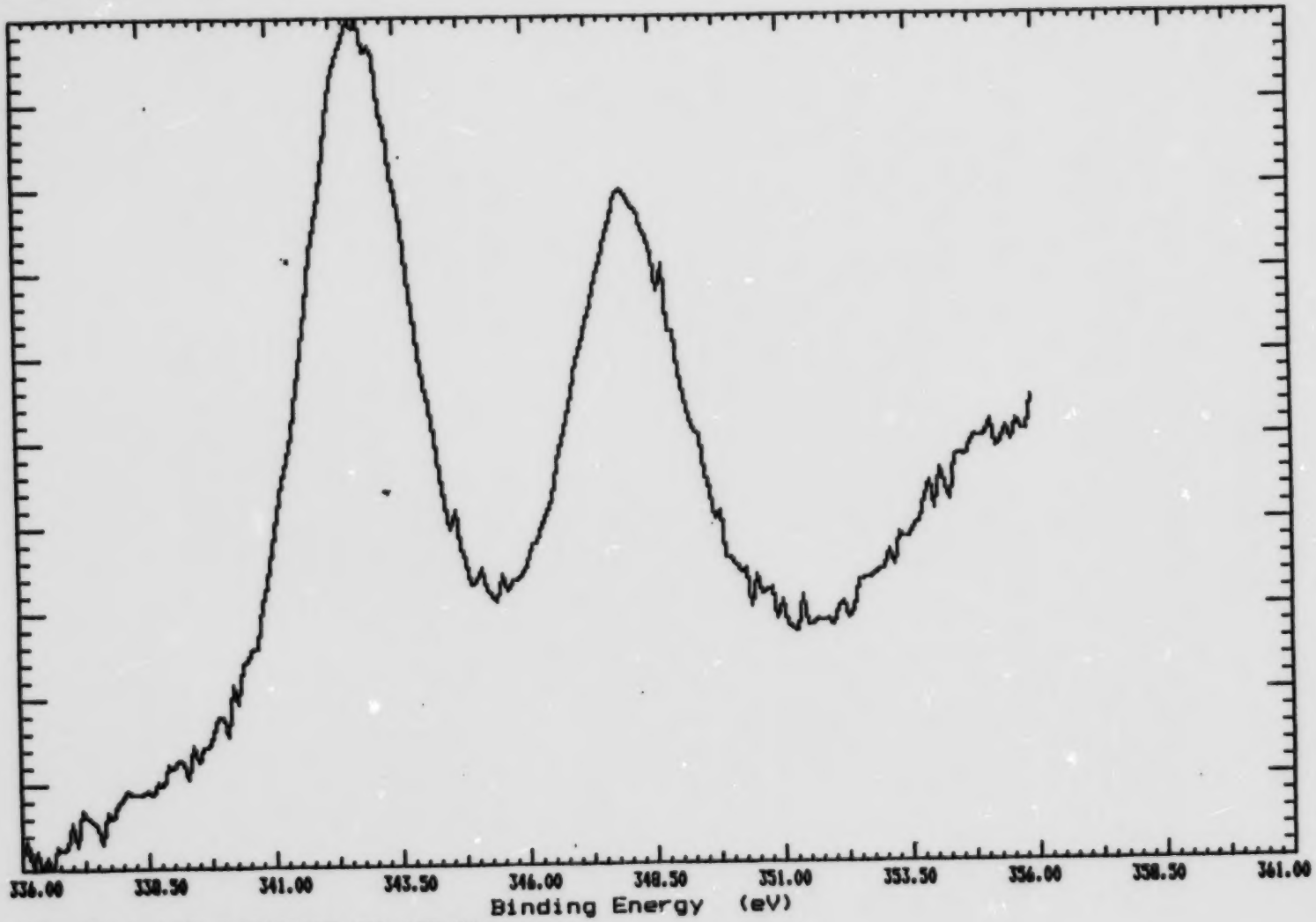
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 7050
Step Size = 0.10 eV. 30 Scans of 200 channels at 50 ms per chan



A8. BL-4-142-A-REDUIT CM 15D/H
MG300 NR
23 NOV.89 16H45

ASA3 Region 3 PD3D VG SCIENTIFIC

Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 382
Step Size = 0.10 eV. 2500 Scans of 200 channels at 50 ms per chan

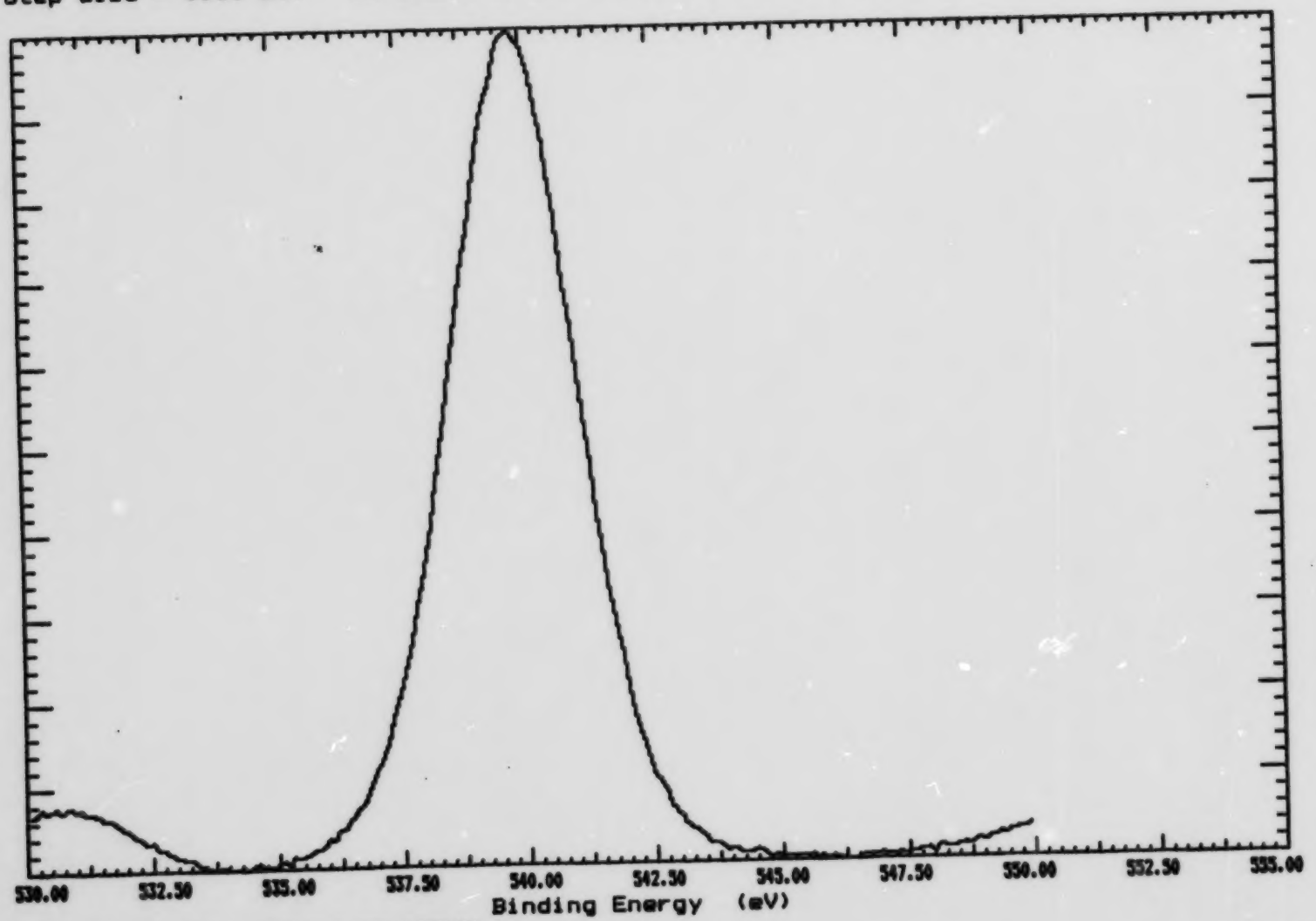


AS. GL-4-142-A-REDUIT CM 15D/H
M6300 NR
23 NOV.89 16H45

ASA3 Region 4 018

VG SCIENTIFIC

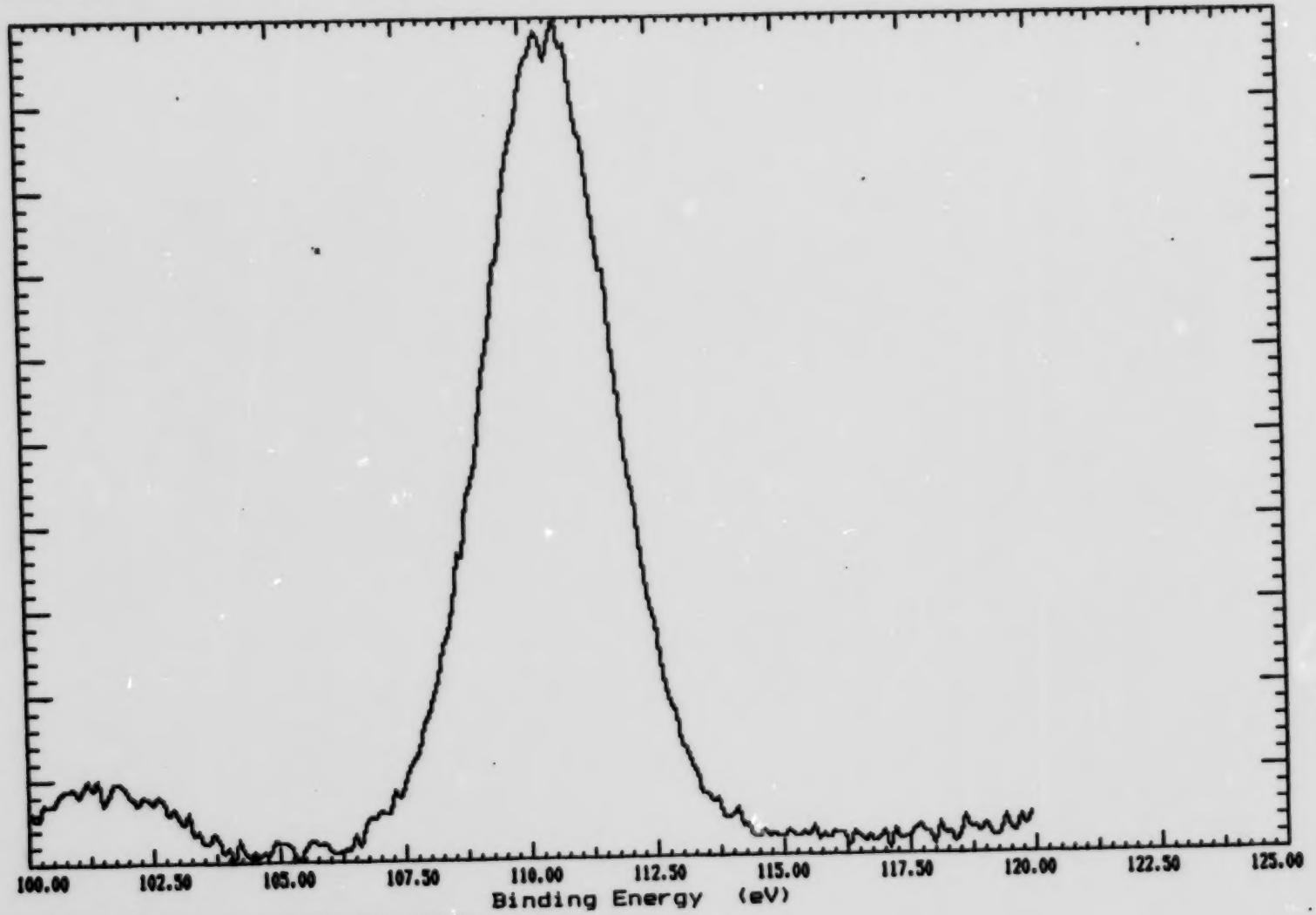
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 29925
Step Size = 0.10 eV. 20 Scans of 200 channels at 50 ms per chan



AB. GL-4-142-A-REDUIT CM 15D/H
M8300 NR
23 NOV.89 16H45

ASA3 Region 5 SI2P VG SCIENTIFIC

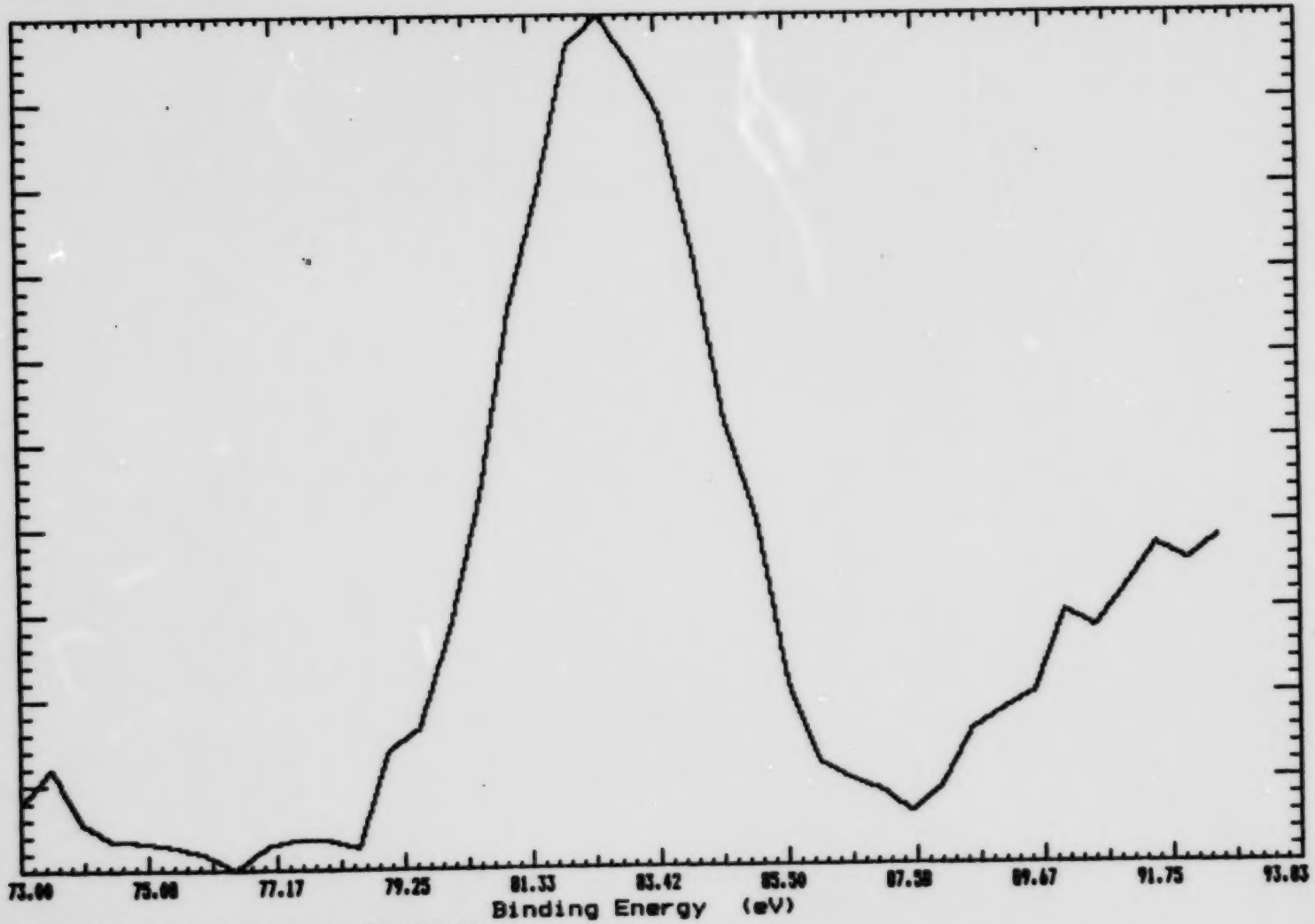
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 5642
Step Size = 0.10 eV. 15 Scans of 200 channels at 50 ms per chan



AS. GL-4-142-A-REDUIT CM 15D/H
MG300 NR
23 NOV.89 16H45

ASA3 Region 6 AL2P VG SCIENTIFIC

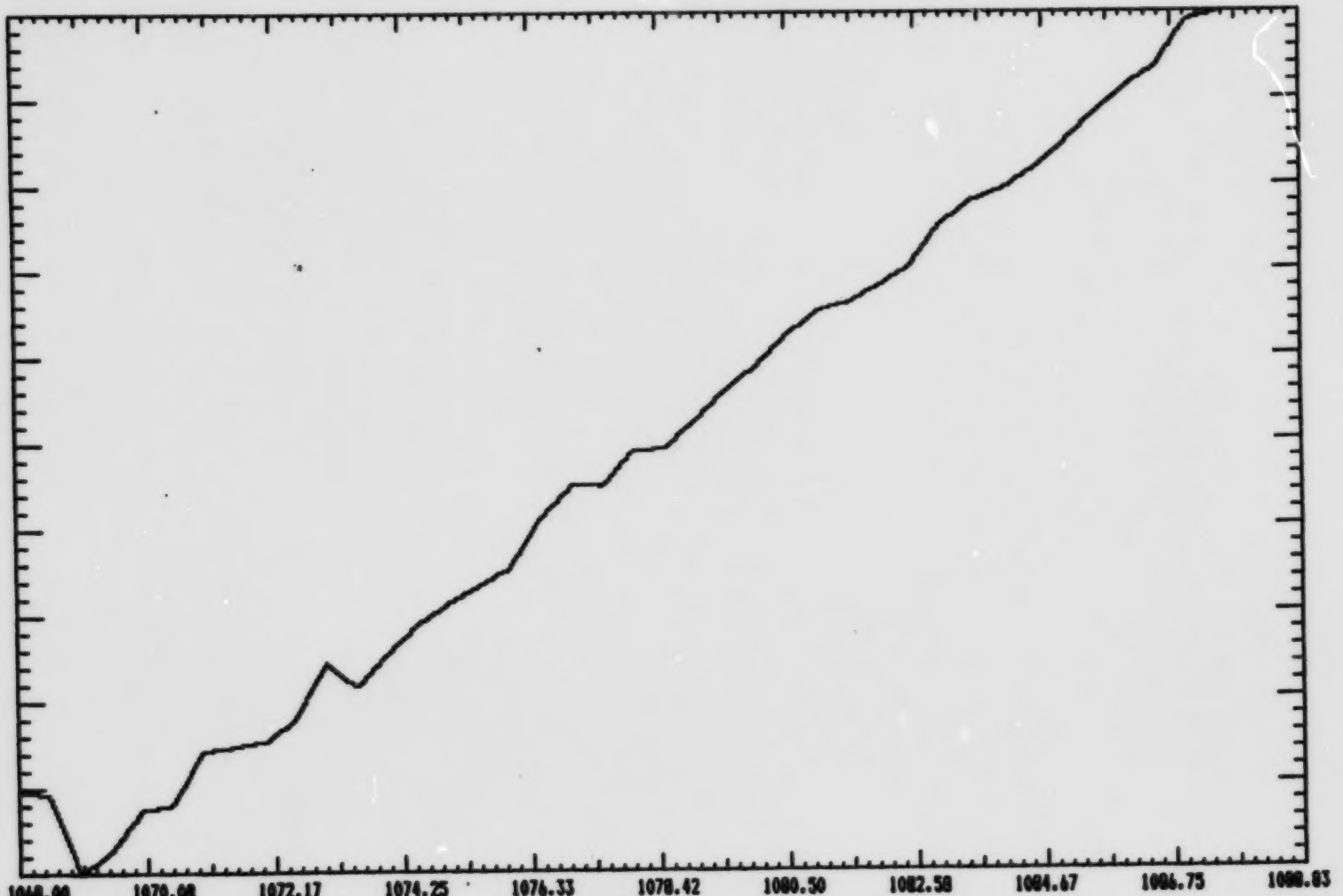
Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 649
Step Size = 0.50 eV. 500 Scans of 40 channels at 50 ms per chan



AS. GL-4-142-A-REDUIT CM 15D/H
M8300 NR
23 NOV.89 16H45

ASA3 Region 7 NA18 VG SCIENTIFIC

Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 3939
Step Size = 0.50 eV. 500 Scans of 40 channels at 50 ms per chan



AS. GL-4-142-A-REDUIT CM 15D/H
MG300 NR
23 NOV.89 16H45

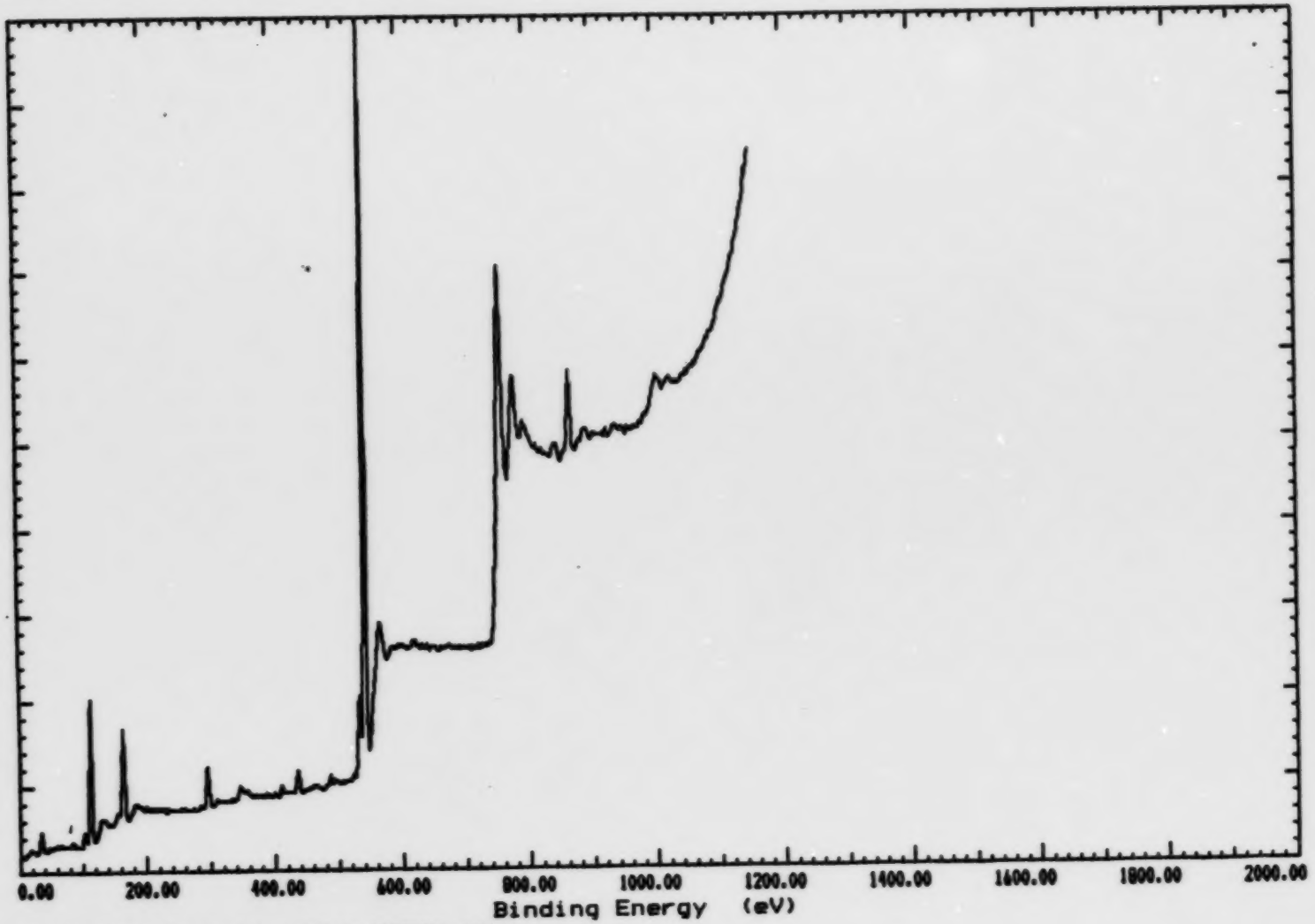
Pd/HZSM-5(A)

Sample No. 142A (3.00% Pd)

REDUCED AND GROUND

ASA4 Region 1 SURVEY VG SCIENTIFIC

Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 125222
Step Size = 1.00 eV. 7 Scans of 1150 channels at 50 ms per chan

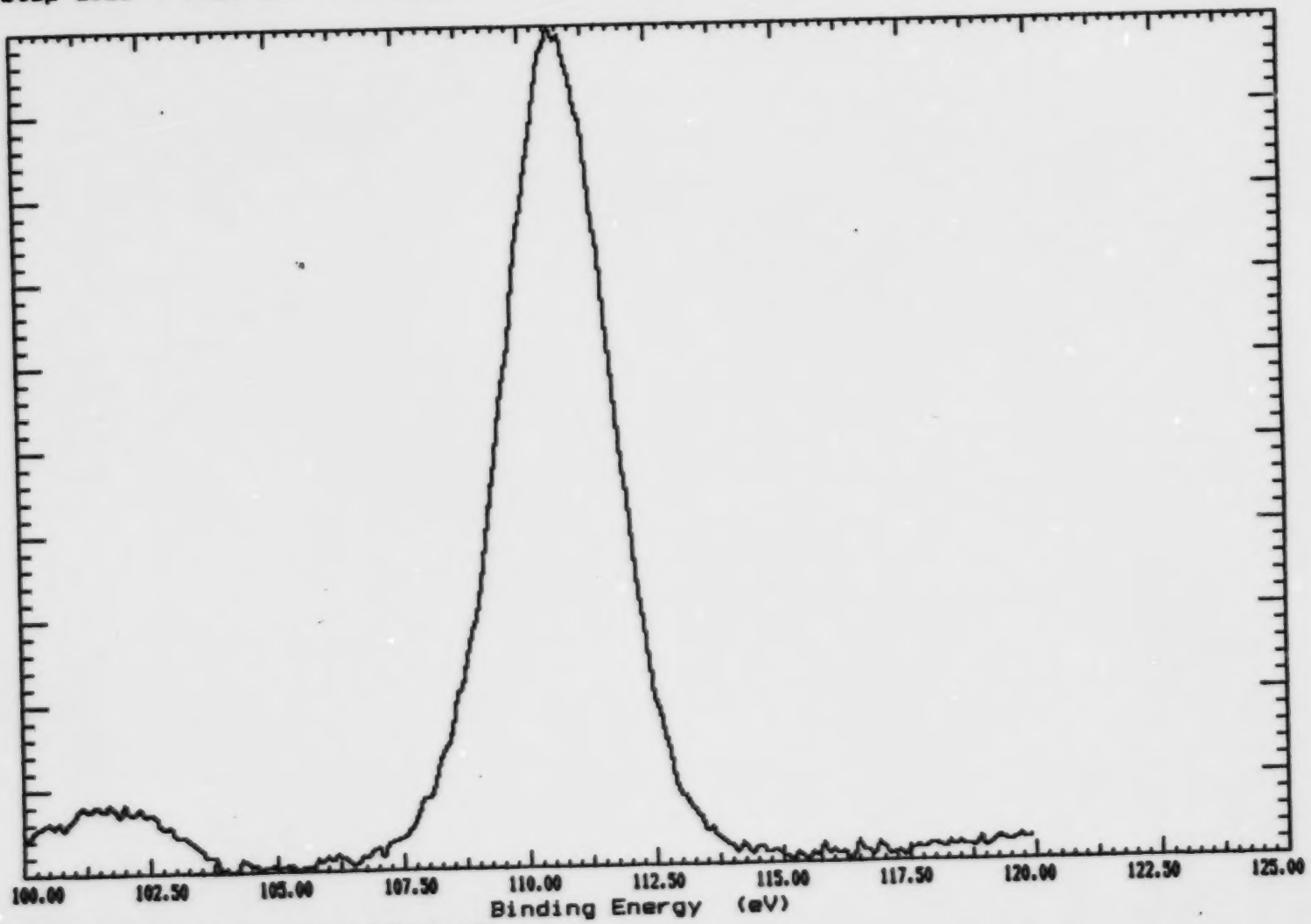


GL-4-142A-R-B CM 15D/H MG300 NR
OPT SI2P+MECA
11H10 24 NOV 89

ASA4 Region 2 SI2P

VG SCIENTIFIC

Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 5144
Step Size = 0.10 eV. 30 Scans of 200 channels at 50 ms per chan

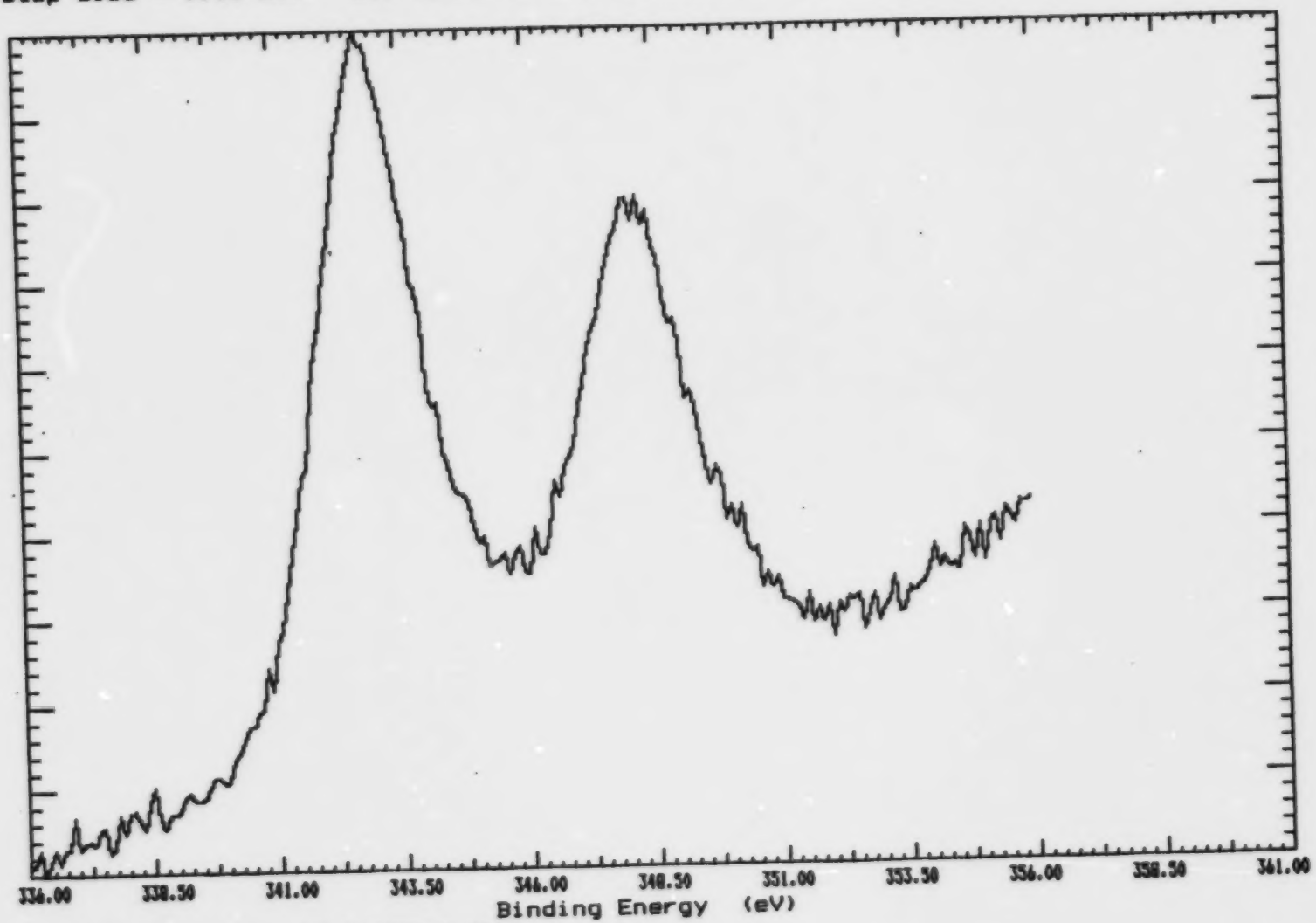


GL-4-142A-R-B CM 15D/H MG300 NR
OPT SI2P+MECA
11H10 24 NOV 89

ASA4 Region 3 PD3D

VG SCIENTIFIC

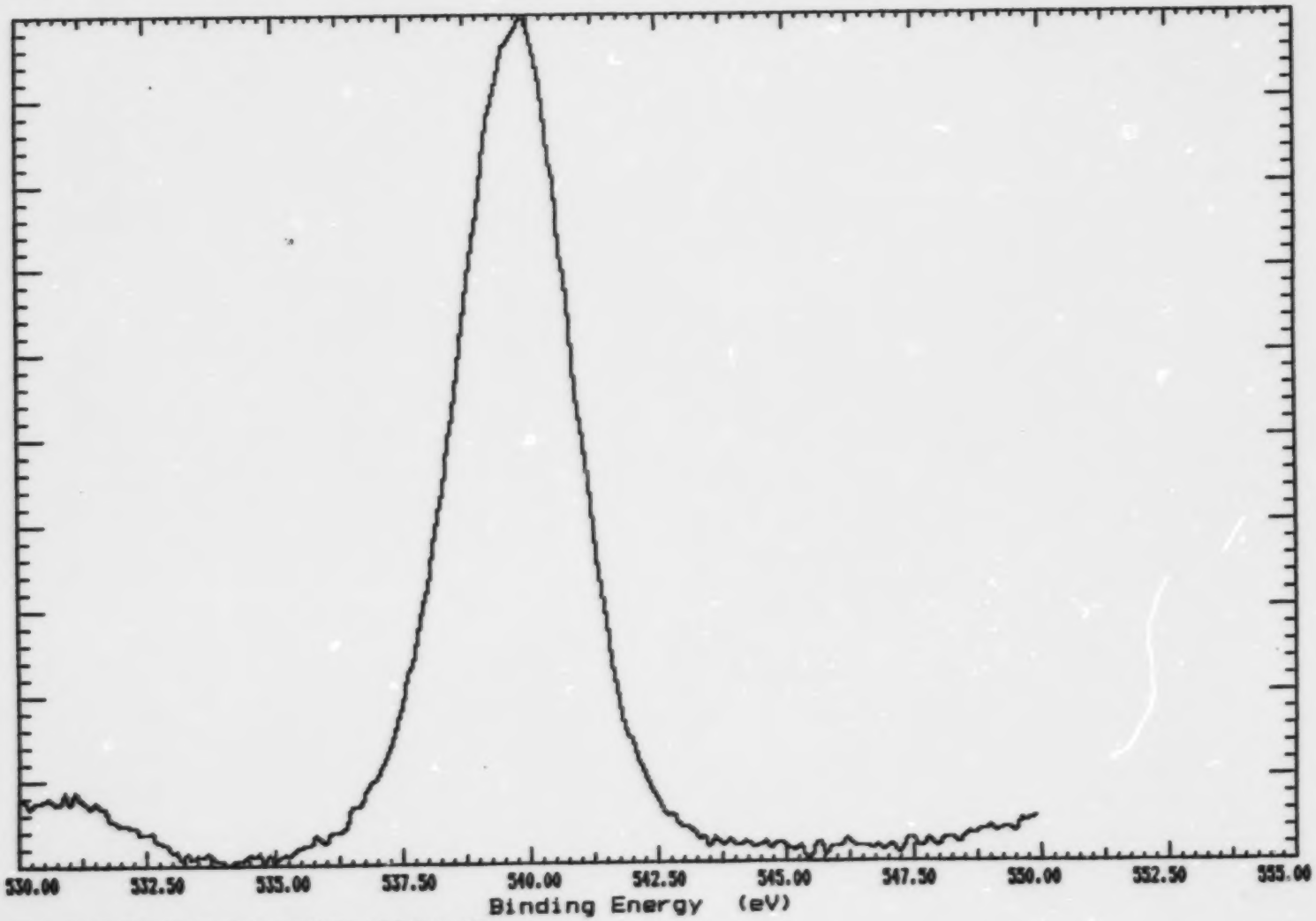
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 549
Step Size = 0.10 eV. 810 Scans of 200 channels at 50 ms per chan



GL-4-142A-R-B CM 15D/H MG300 NR
OPT SI2P+MECA
11H10 24 NOV 89

ASA4 Region 4 01S VG SCIENTIFIC

Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 26333
Step Size = 0.10 eV. 6 Scans of 200 channels at 50 ms per chan

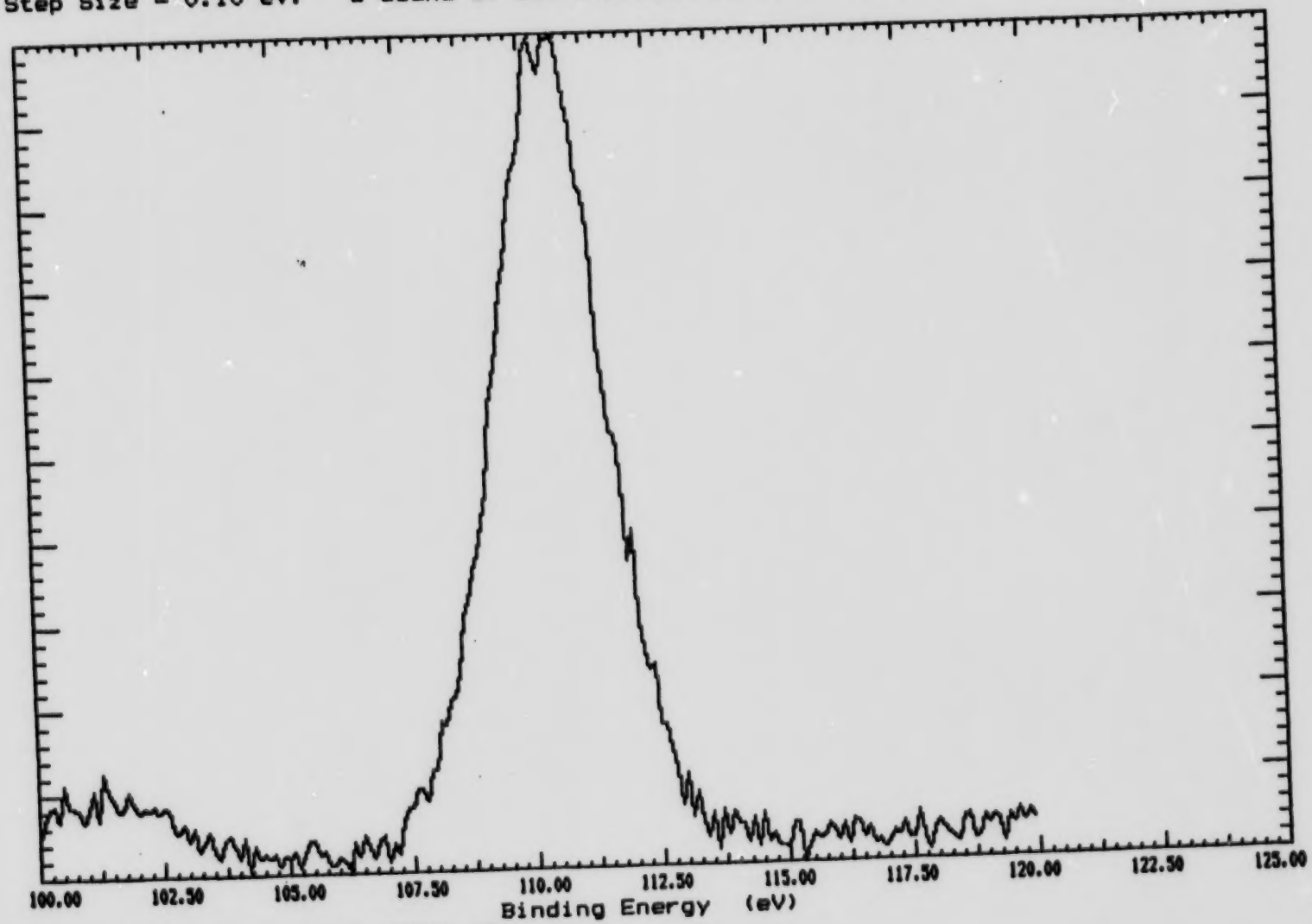


GL-4-142A-R-B CM 15D/H MG300 NR
OPT SI2P+MECA
11H10 24 NOV 89

ASA4 Region 5 SI2P

VG SCIENTIFIC

Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 5087
Step Size = 0.10 eV. 5 Scans of 200 channels at 50 ms per chan

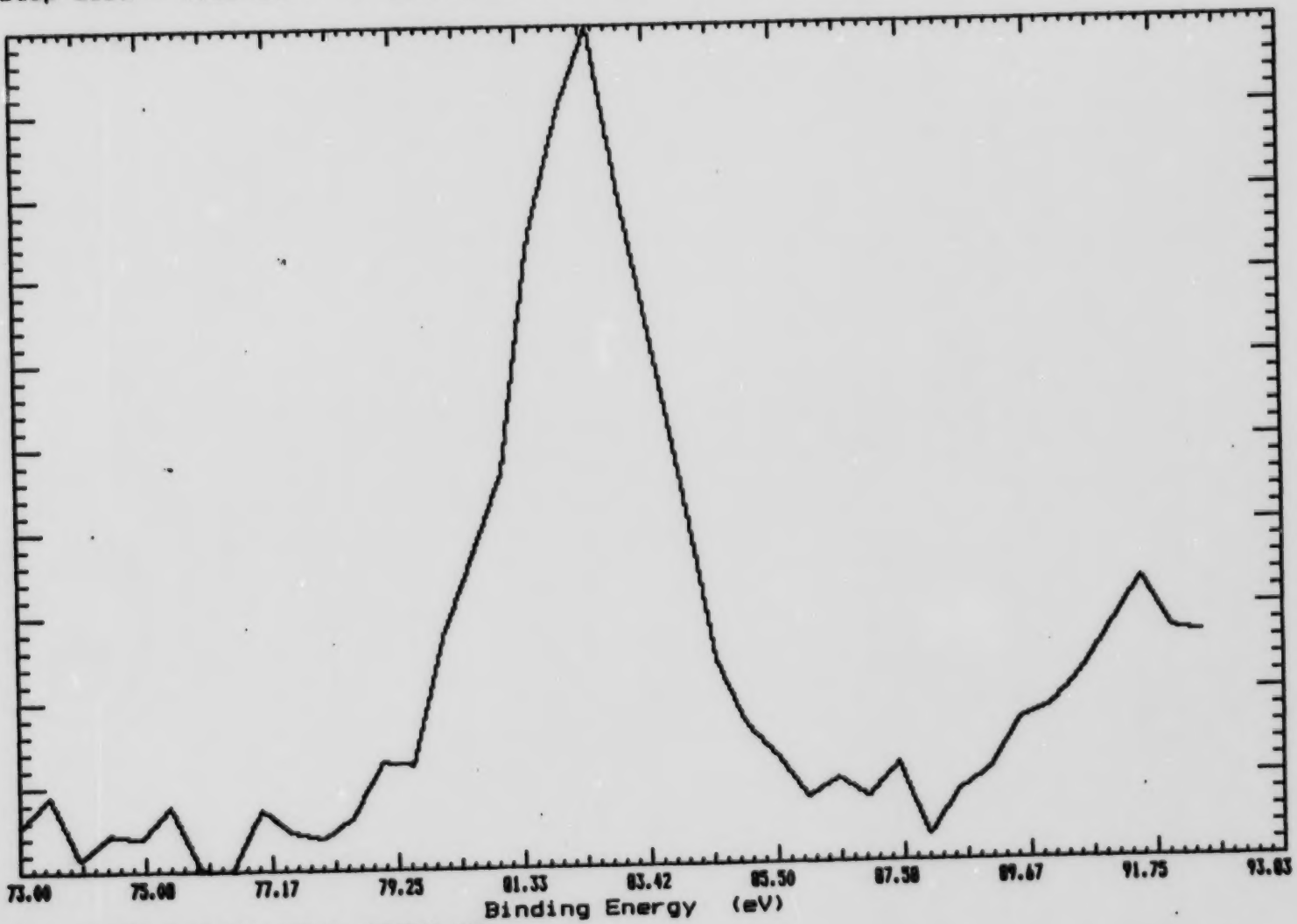


GL-4-142A-R-B CM 15D/H MG300 NR
OPT SI2P+MECA
11H10 24 NOV 89

ASA4 Region 6 AL2P

VG SCIENTIFIC

Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 830
Step Size = 0.50 eV. 75 Scans of 40 channels at 50 ms per chan

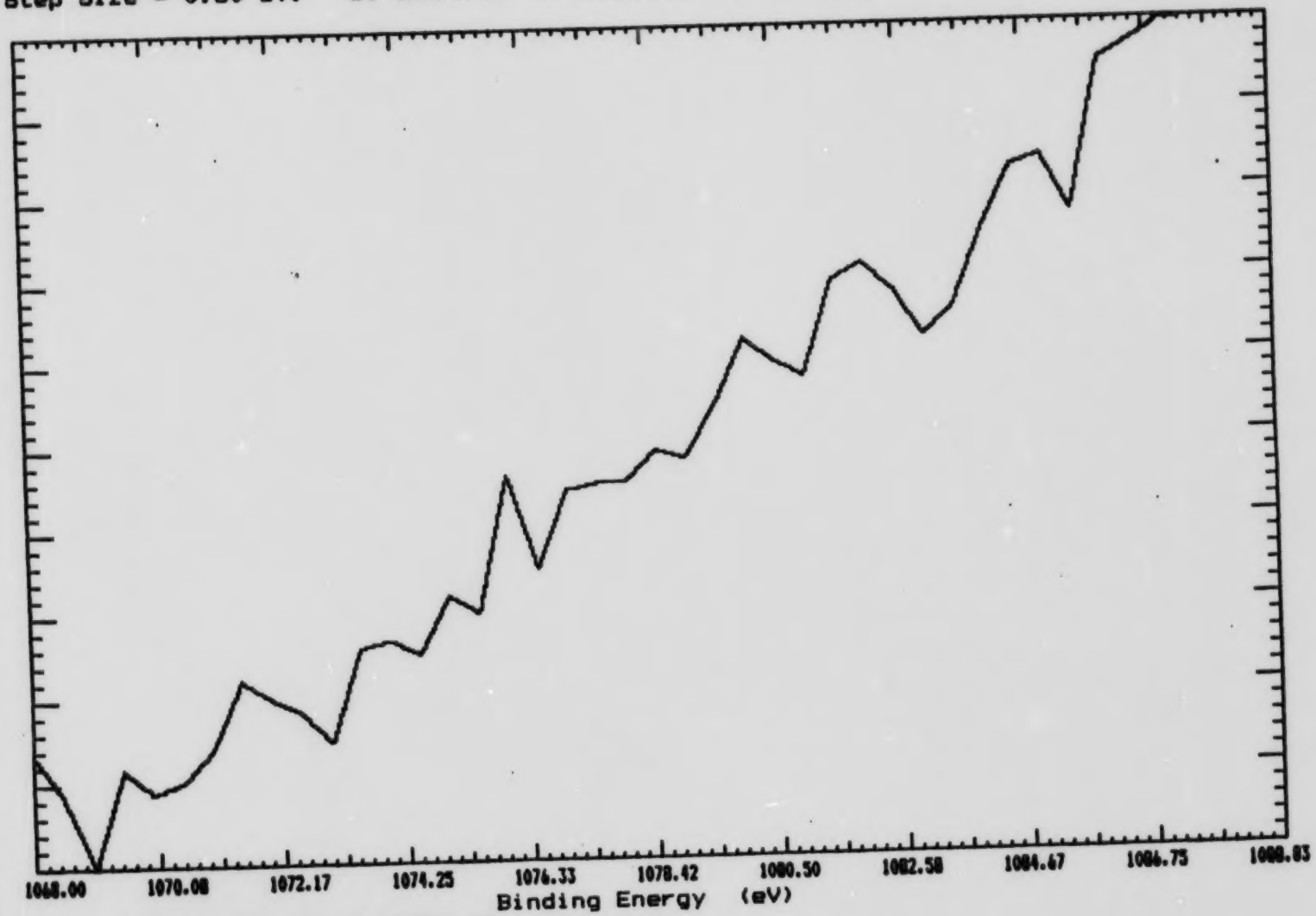


GL-4-142A-R-B CM 15D/H MG300 NR
OPT SI2P+MECA
11H10 24 NOV 89

ASA4 Region 7 NA1S

VG SCIENTIFIC

Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 3686
Step Size = 0.50 eV. 50 Scans of 40 channels at 50 ms per chan



GL-4-142A-R-B CM 15D/H MG300 NR
OPT SI2P+MECA
11H10 24 NOV 89

Pd/HZSM-5(B)

Sample No. 142B (2.43% Pd)

Prepared by ion-exchange

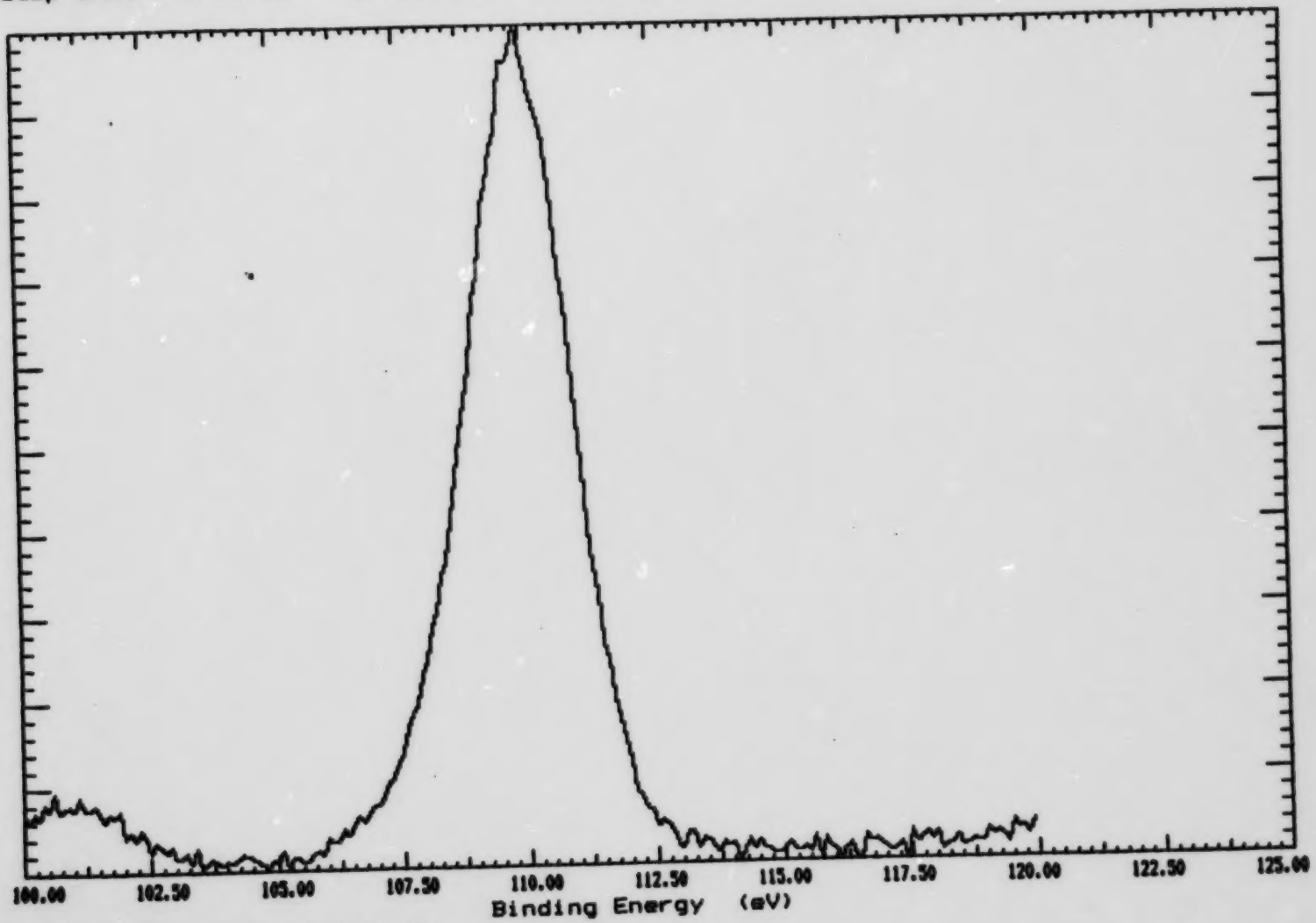
Pd/HZSM-5(B)

Sample No. 142B (2.43% Pd)

CALCINED

ASA15 Region 1 SI2P VG SCIENTIFIC

Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 3342
Step Size = 0.10 eV. 30 Scans of 200 channels at 50 ms per chan

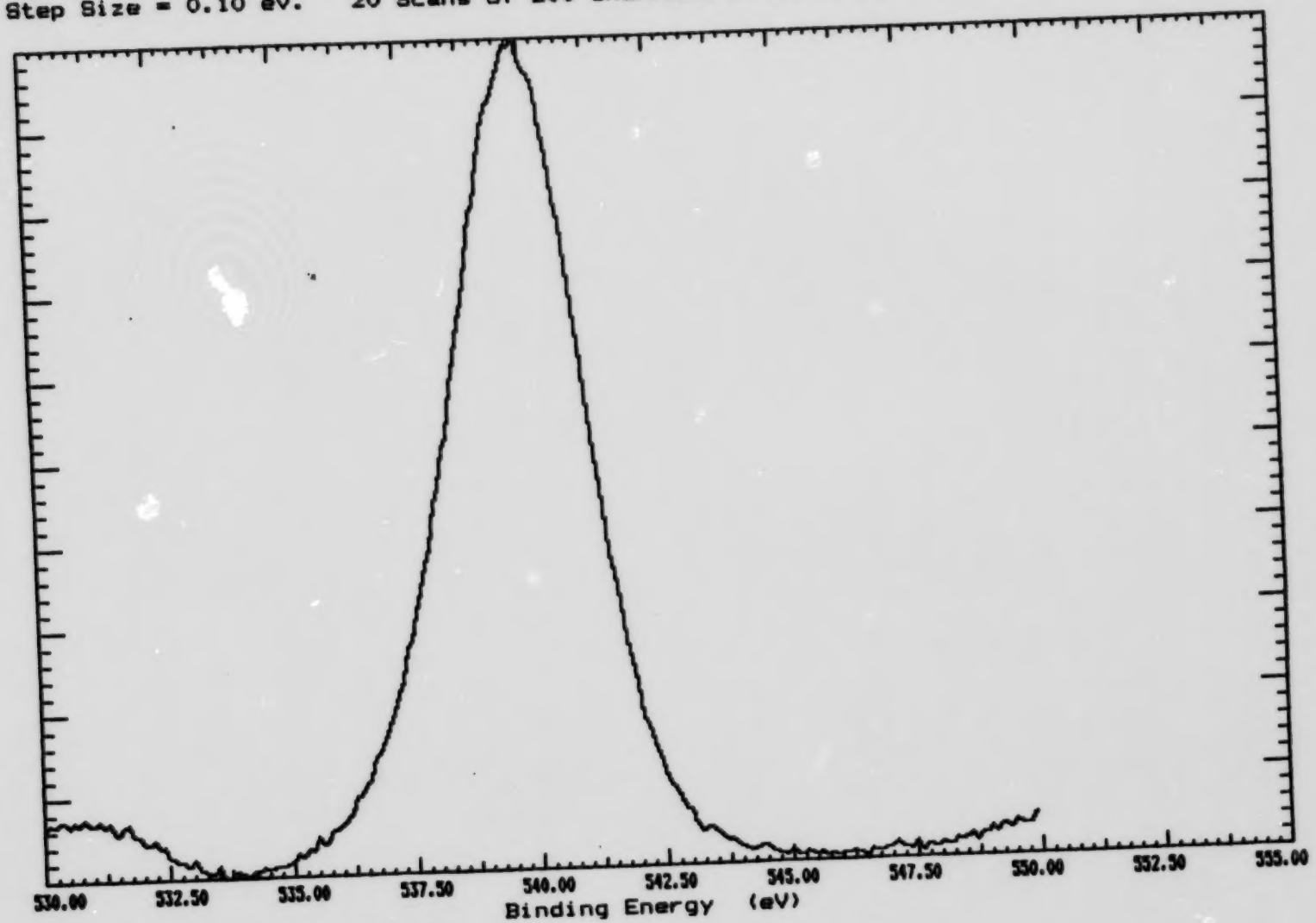


GL-4-142B CM 15D/H MG300 NR
OPT SI2P+MECA
17H40 28 NOV 89

ASA15 Region 3 018

VG SCIENTIFIC

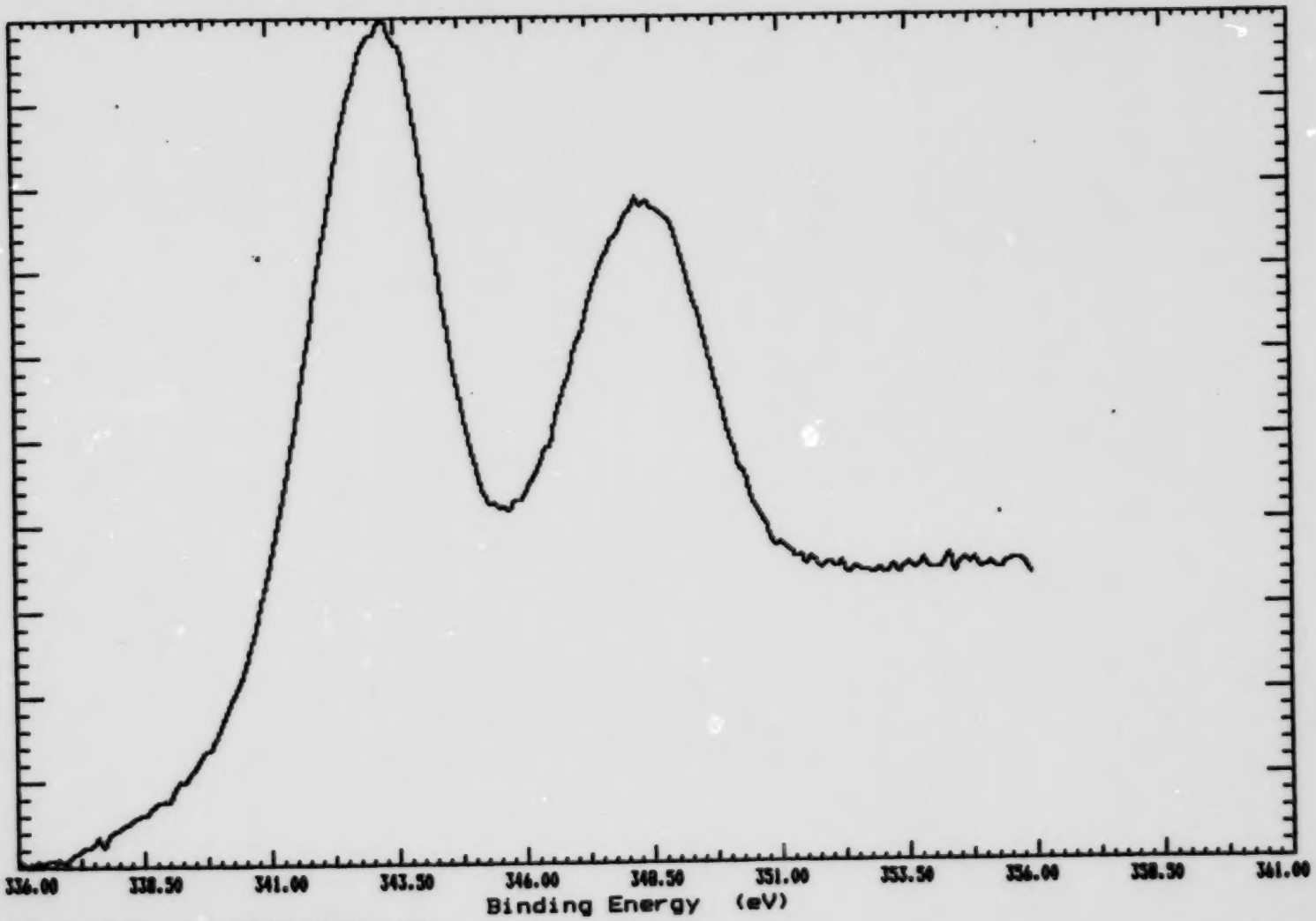
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 15166
Step Size = 0.10 eV. 20 Scans of 200 channels at 50 ms per chan



GL-4-142B CM 15D/H MG300 NR
OPT SI2P+MECA
17H40 28 NOV 89

ASA15 Region 2 PD3D VG SCIENTIFIC

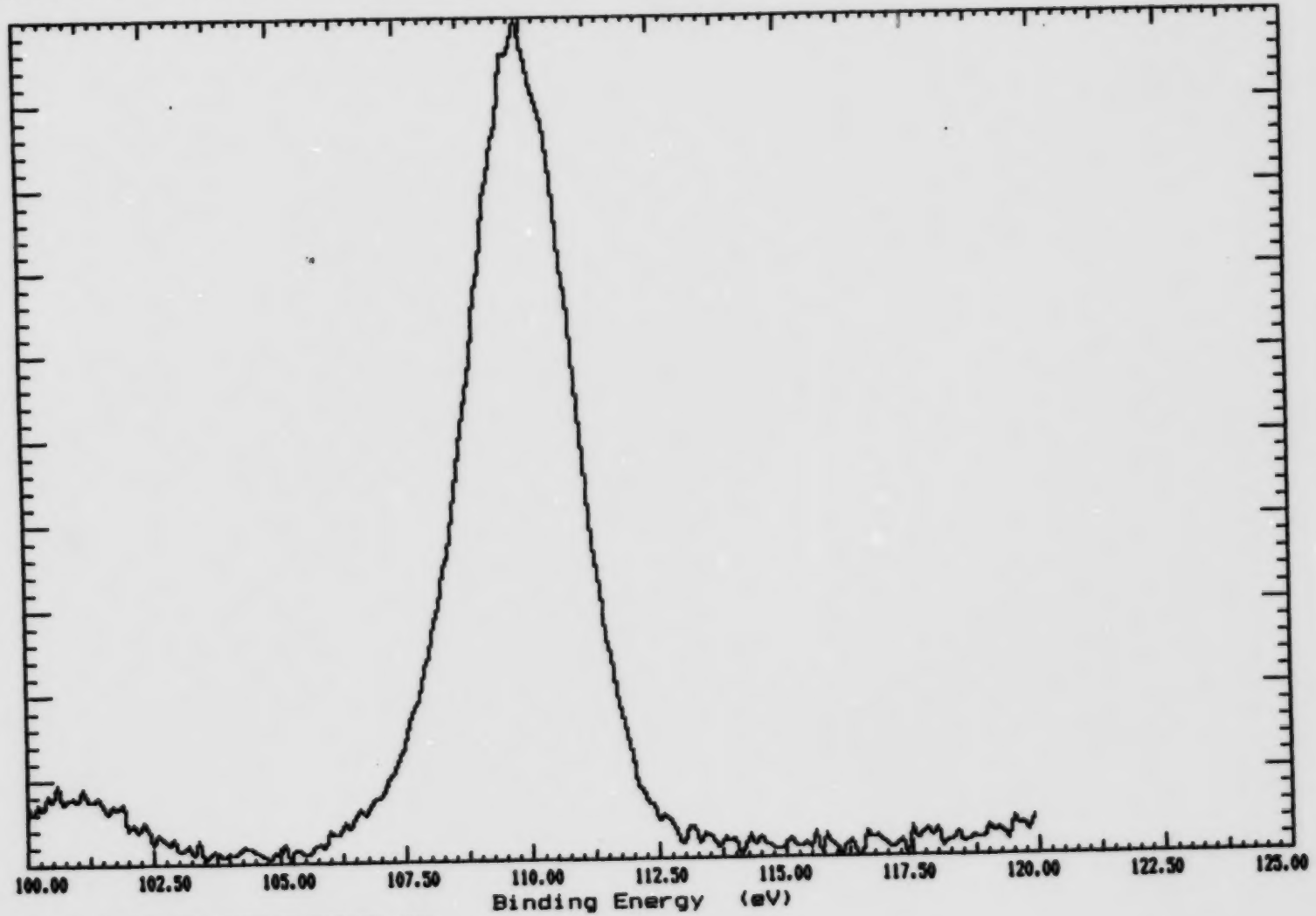
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 1092
Step Size = 0.10 eV. 2000 Scans of 200 channels at 50 ms per chan



GL-4-142B CM 15D/H MG300 NR
OPT SI2P+MECA
17H40 28 NOV 89

ASA15 Region 1 SI2P VG SCIENTIFIC

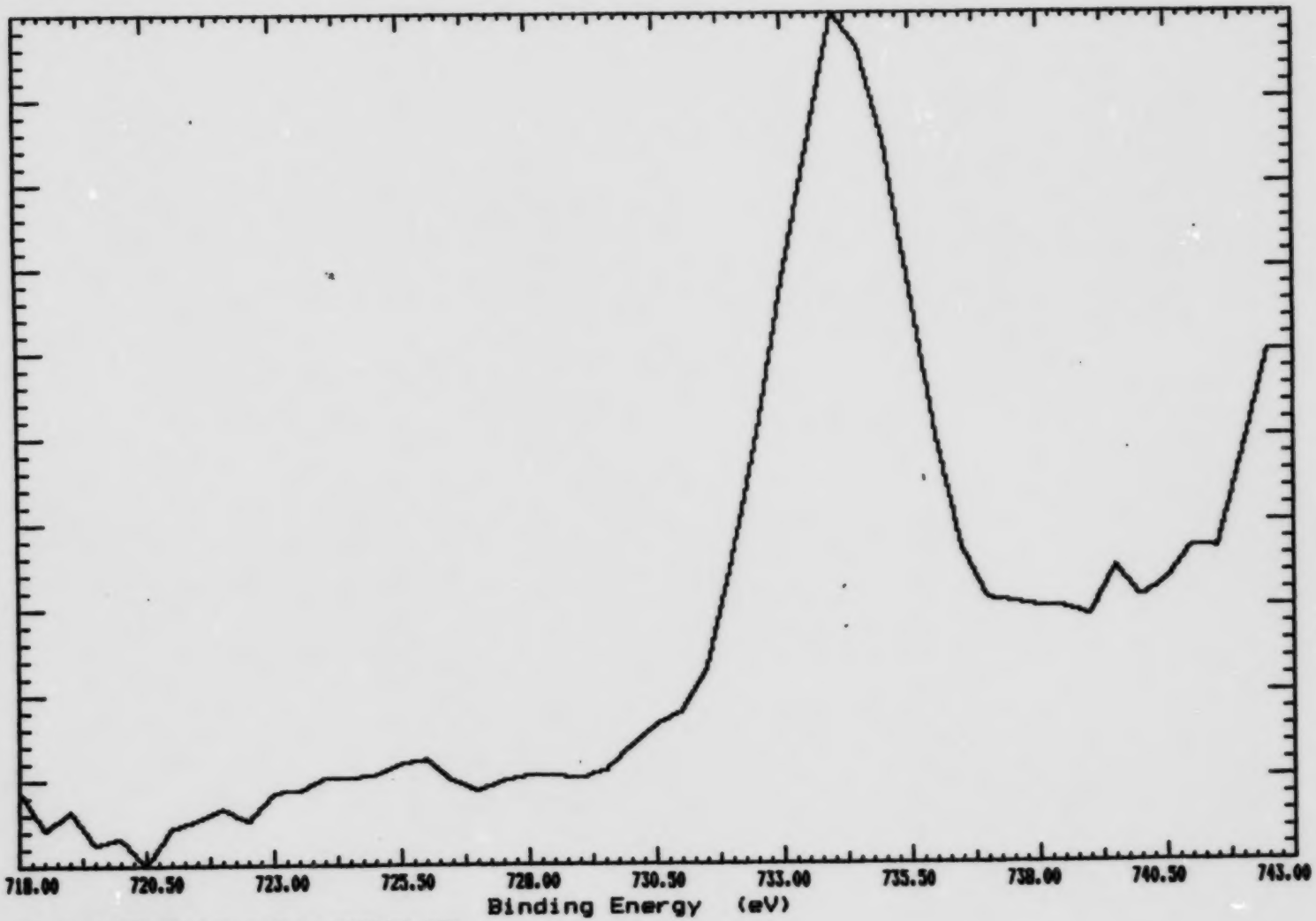
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 3342
Step Size = 0.10 eV. 30 Scans of 200 channels at 50 ms per chan



GL-4-142B CM 15D/H MG300 NR
OPT SI2P+MECA
17H40 28 NOV 89

ASA14 Region 6 CS3D VG SCIENTIFIC

Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 3544
Step Size = 0.50 eV. 180 Scans of 50 channels at 50 ms per chan



GL-4-142B-R CM 15D/H MG300 NR
OPT SI2P+MECA
13H30 28 NOV 89

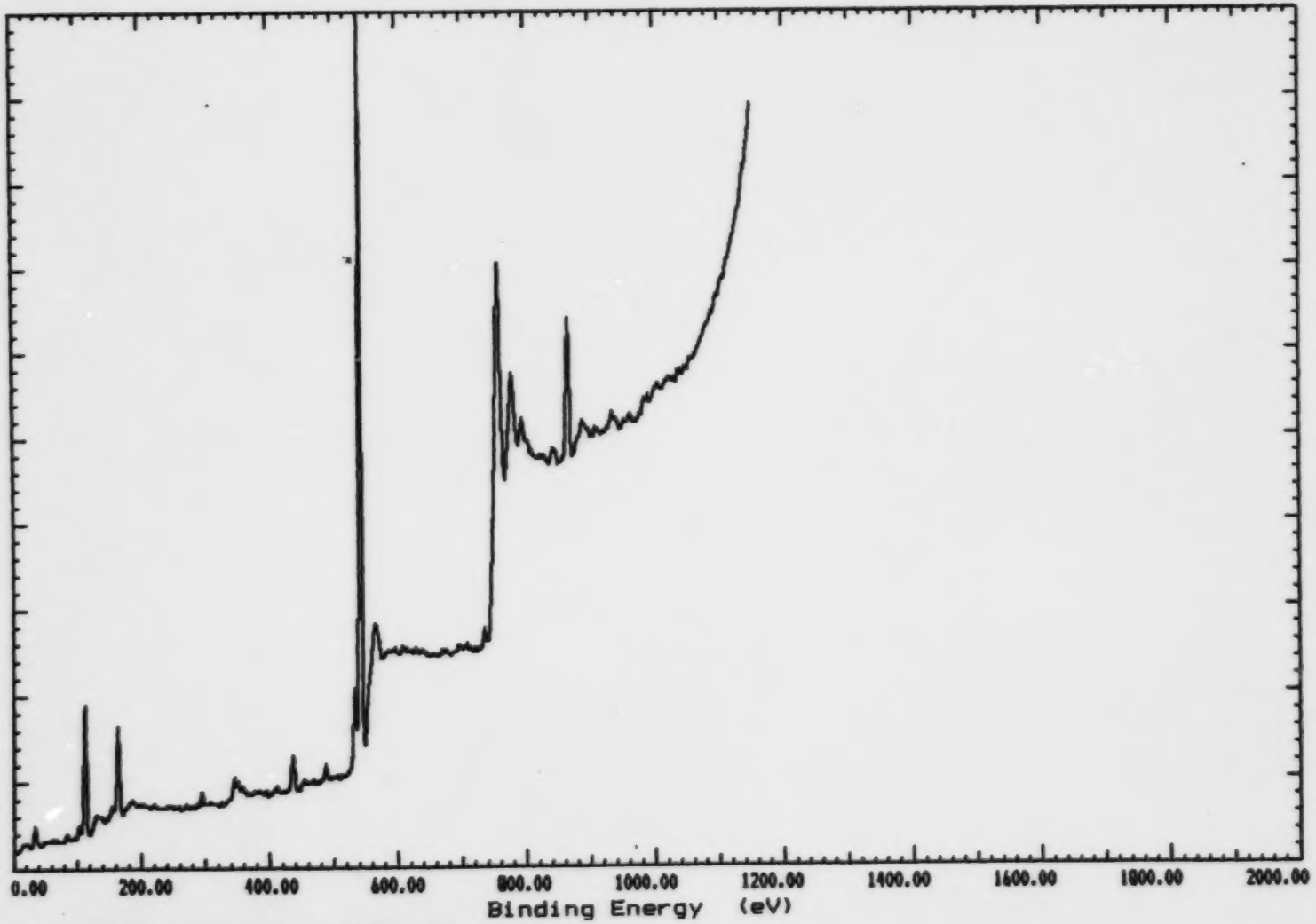
Pd/HZSM-5(B)

Sample No. 142B (2.43% Pd)

REDUCED AND GROUND

ASA23 Region 1 SURVEY VG SCIENTIFIC

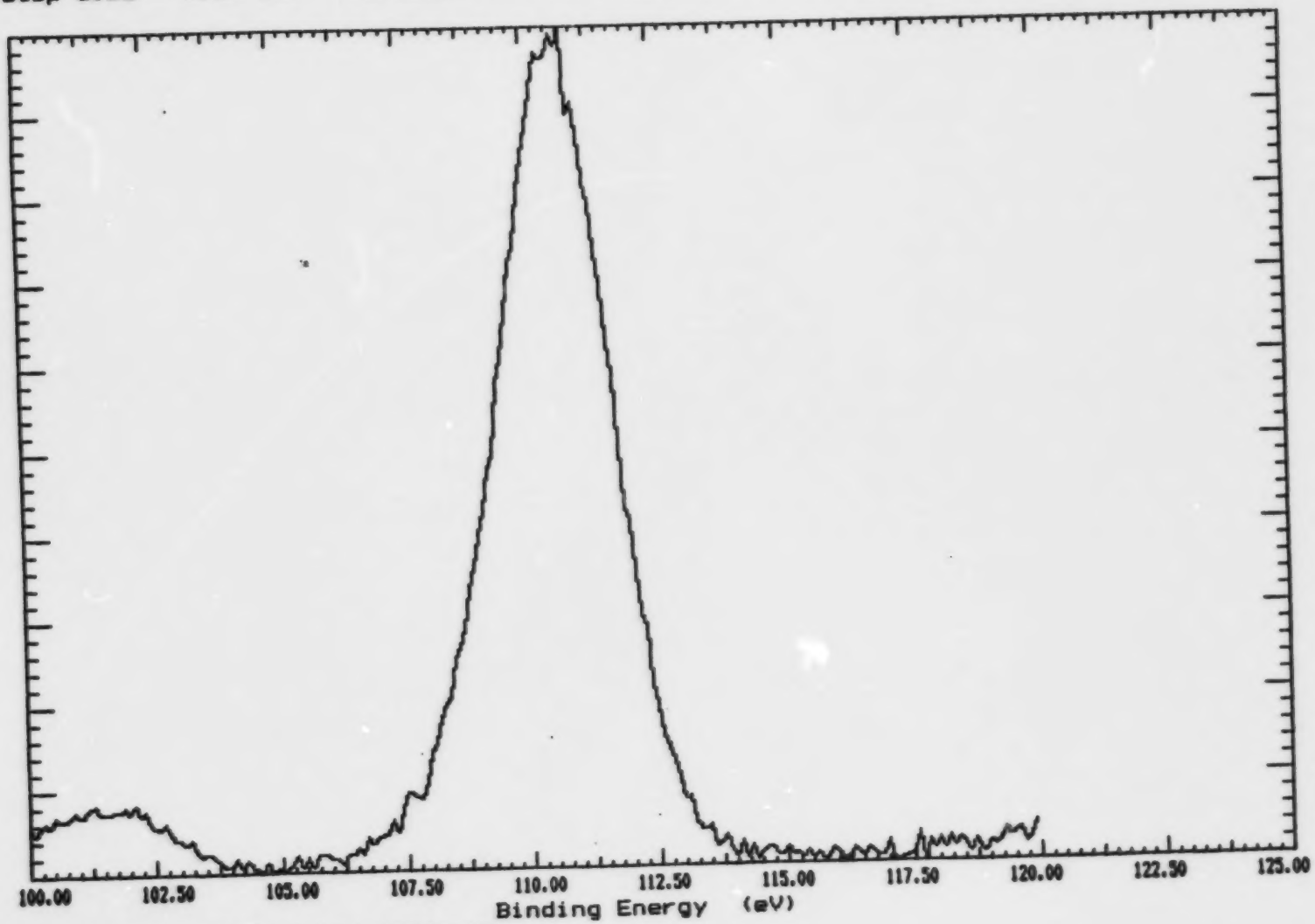
Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 90474
Step Size = 1.00 eV. 7 Scans of 1150 channels at 50 ms per chan



GL-142B-R-B CM 15D/H MG300 NR
REPRISE SURVEY DE ASA13 OPT SI2P +MECA
15H15 30NOV 89

ASA13 Region 1 SI2P VG SCIENTIFIC

Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 3848
Step Size = 0.10 eV. 30 Scans of 200 channels at 50 ms per chan

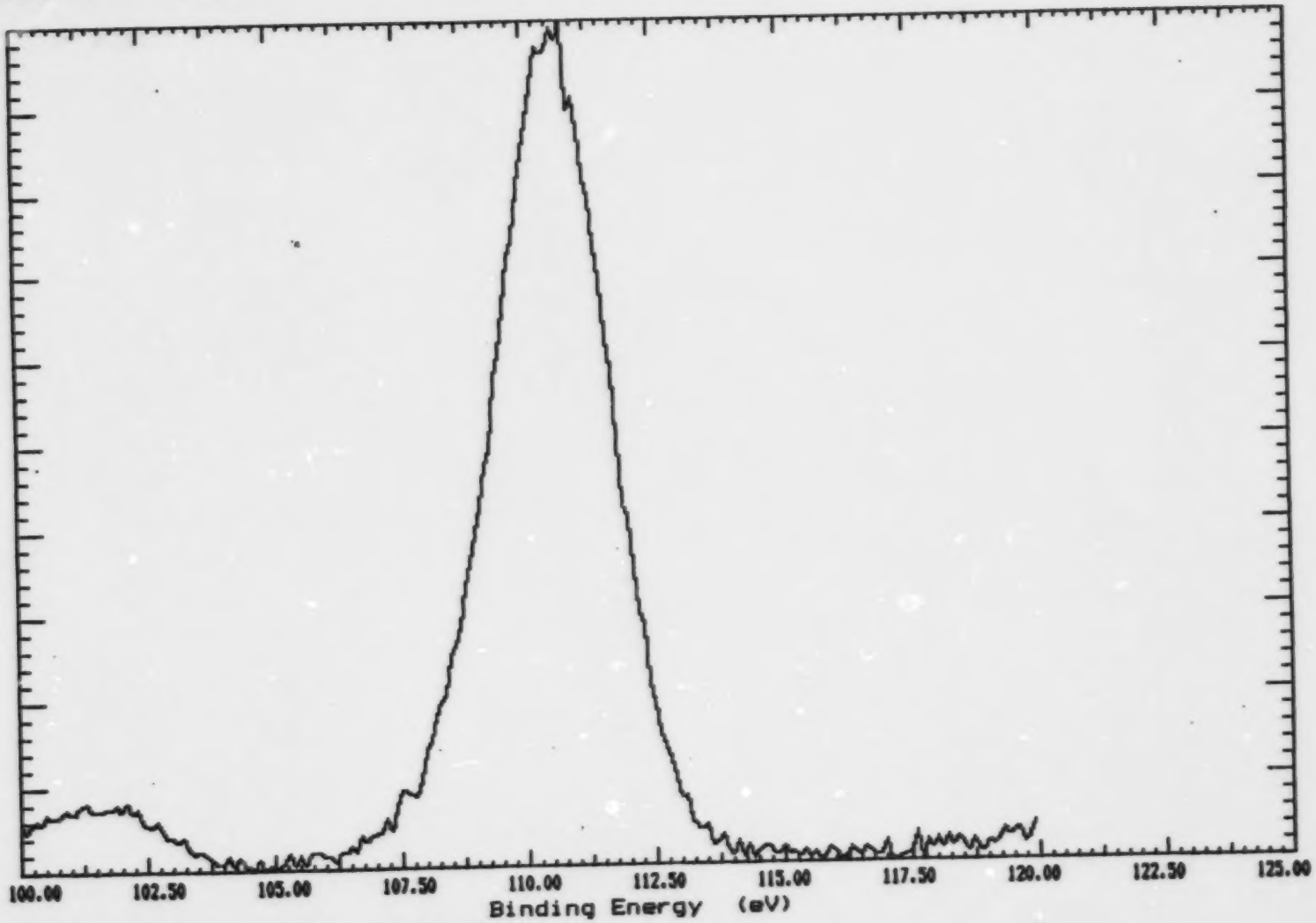


GL-4-142B-R-B CM 15D/H MG300 NR
OPT SI2P+MECA
8H45 28 NOV 89

ASA13 Region 1 SI2P

VG SCIENTIFIC

Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 3848
Step Size = 0.10 eV. 30 Scans of 200 channels at 50 ms per chan

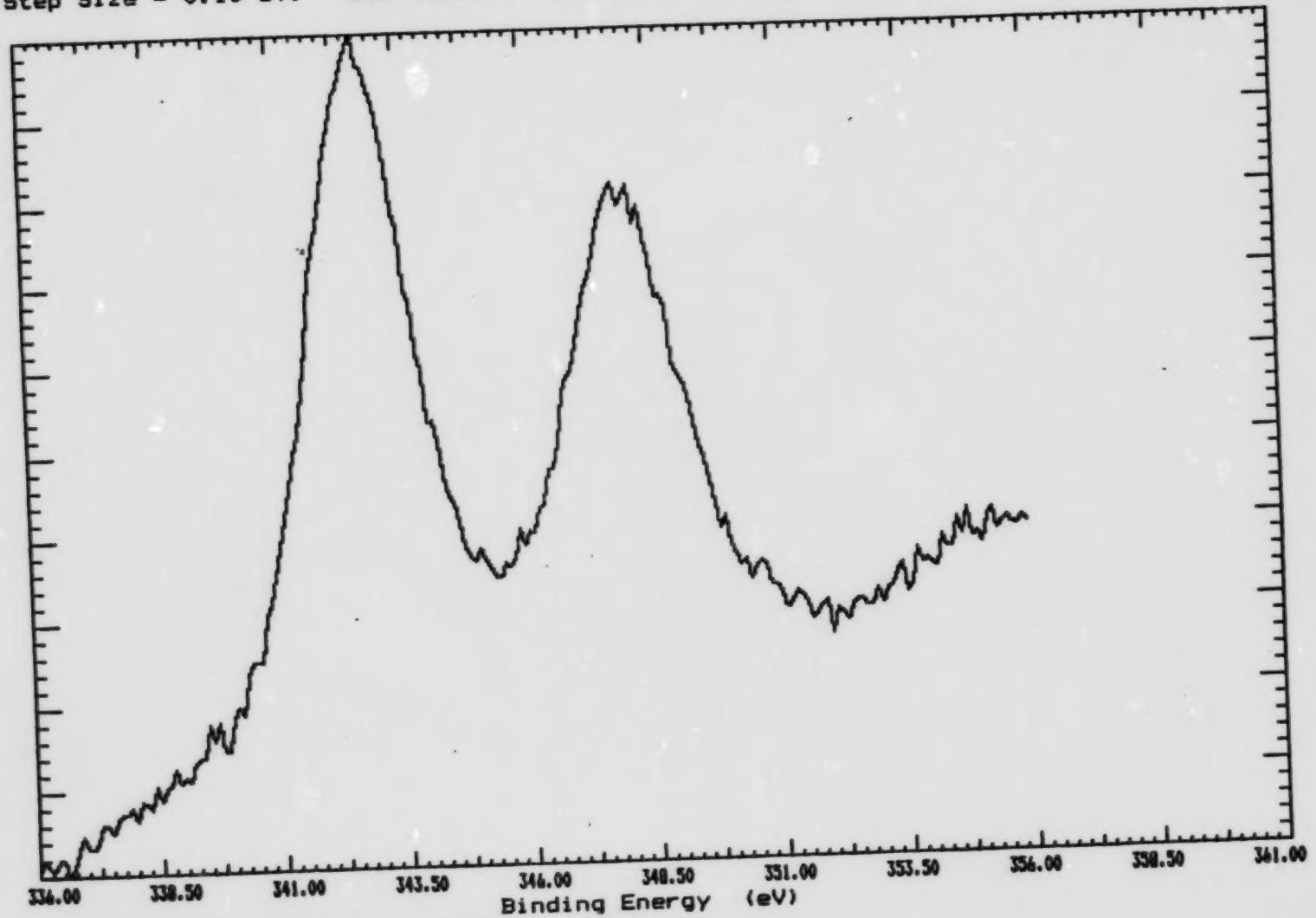


GL-4-142B-R-B CM 15D/H MG300 NR
OPT SI2P+MECA
BH45 28 NOV 89

ASA13 Region 2 PD3D

VG SCIENTIFIC

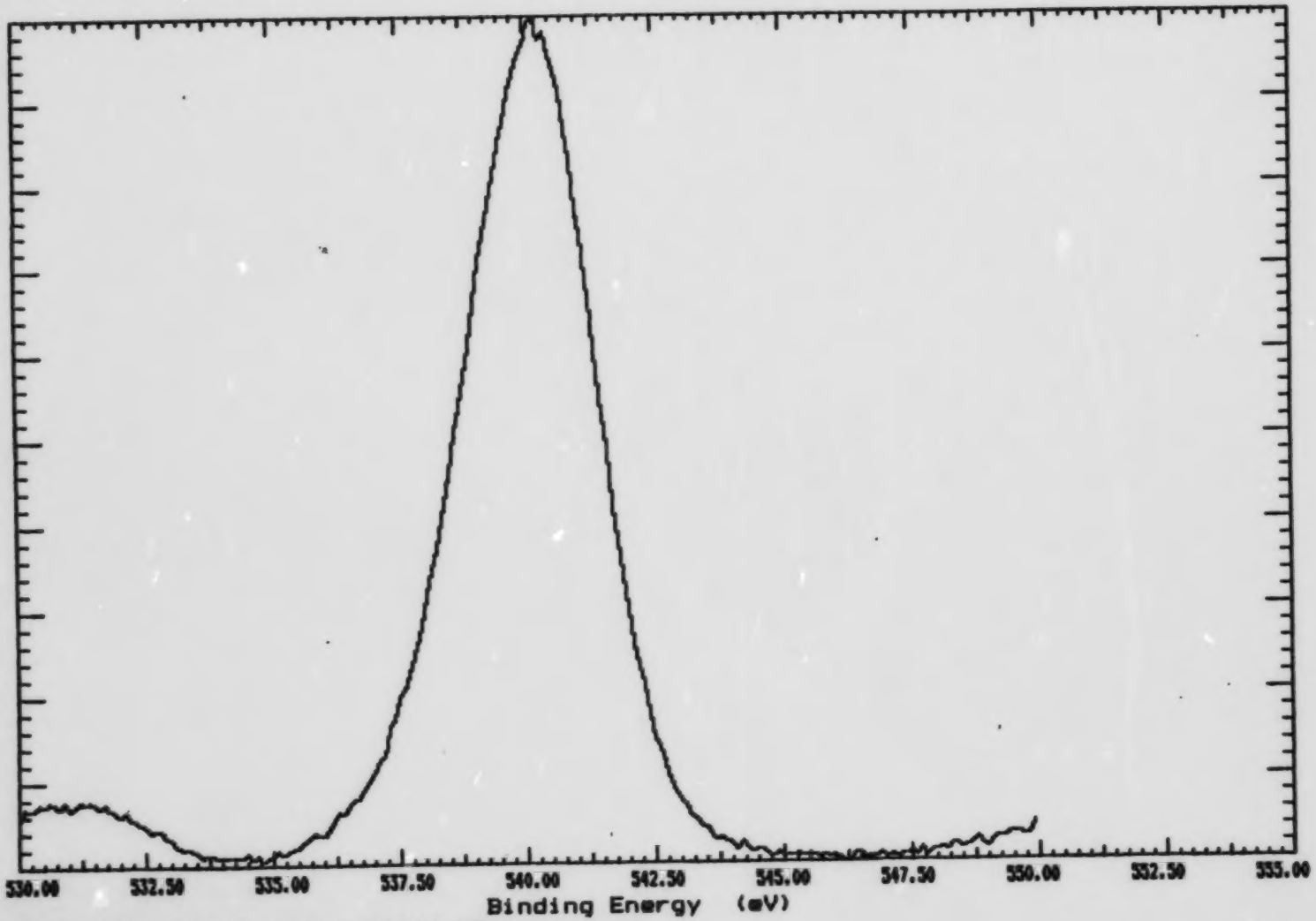
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 771
Step Size = 0.10 eV. 605 Scans of 200 channels at 50 ms per chan



GL-4-142B-R-B CM 15D/H MG300 NR
OPT SI2P+MECA
8H45 28 NOV 89

ASA13 Region 3 01S VG SCIENTIFIC

Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 20349
Step Size = 0.10 eV. 20 Scans of 200 channels at 50 ms per chan

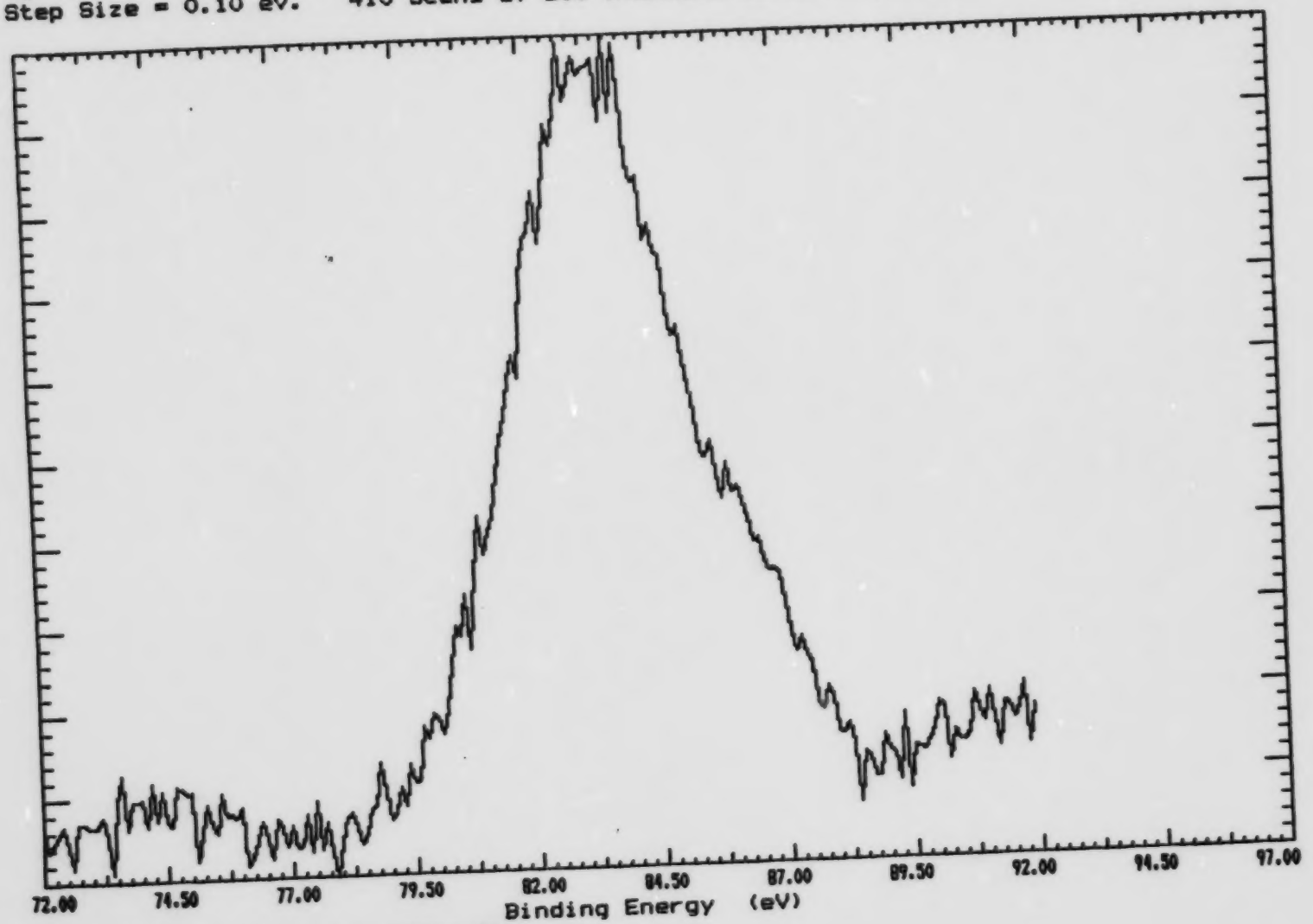


GL-4-142B-R-B CM 15D/H MG300 NR
OPT SI2P+MECA
BH45 28 NOV 89

ASA13 Region 4 ALCS

VG SCIENTIFIC

Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 248
Step Size = 0.10 eV. 410 Scans of 200 channels at 50 ms per chan

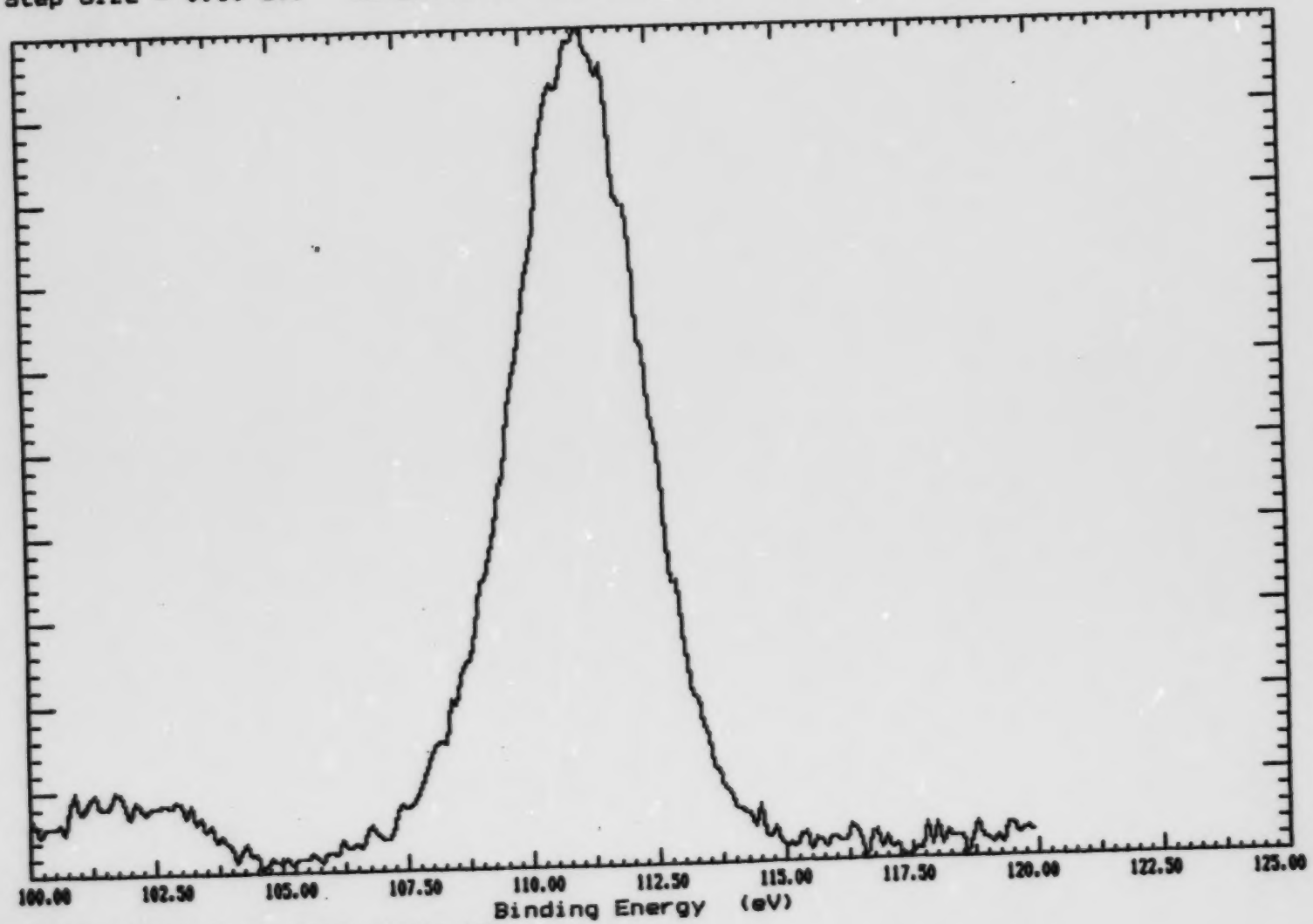


GL-4-142B-R-B CM 15D/H MG300 NR
OPT SI2P+MECA
8H45 28 NOV 89

ASA13 Region 5 SI2P

VG SCIENTIFIC

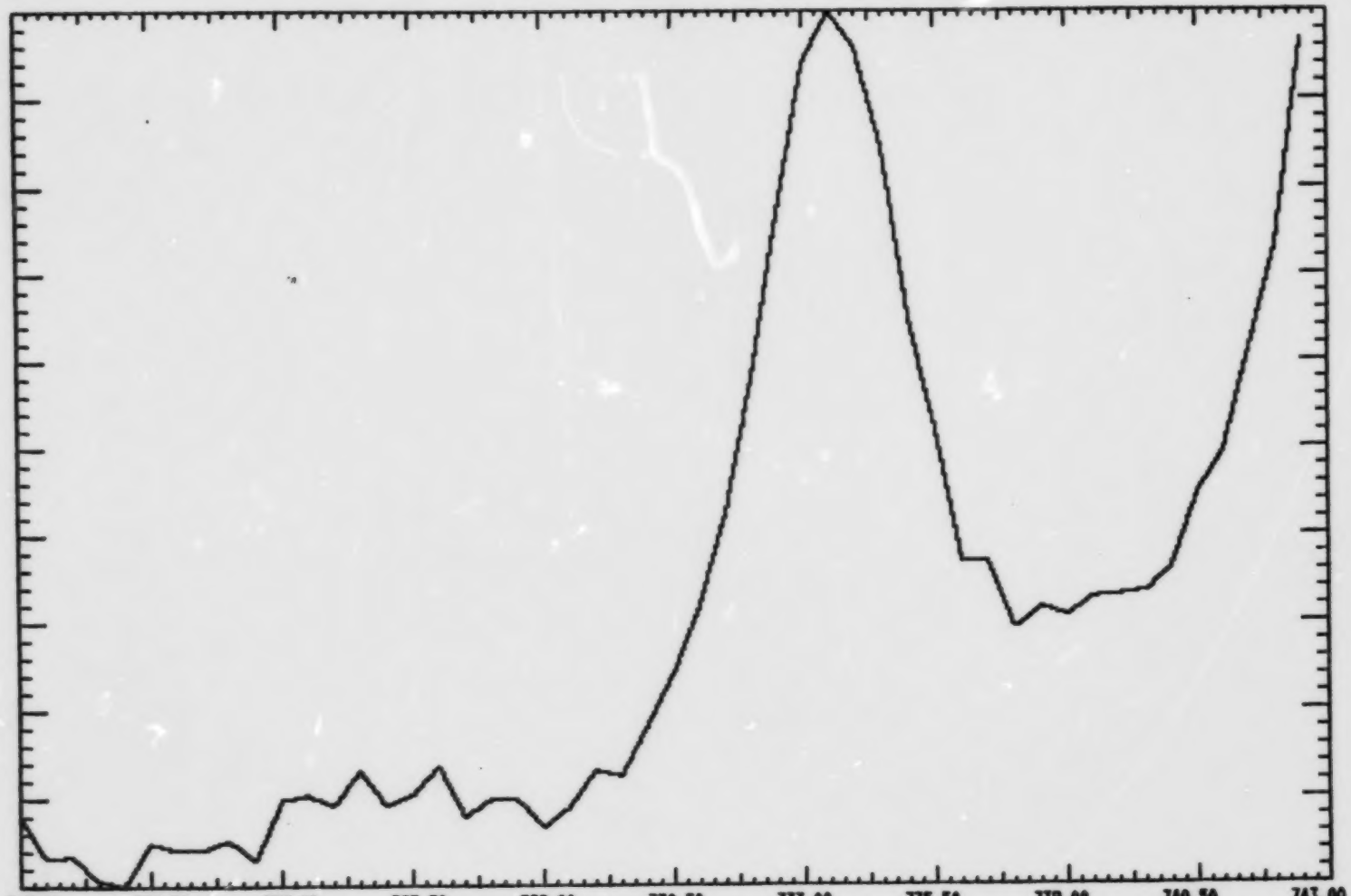
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 3638
Step Size = 0.10 eV. 15 Scans of 200 channels at 50 ms per chan



GL-4-142B-R-B CM 15D/H MG300 NR
OPT SI2P+MECA
BH45 28 NOV 89

ABA13 Region 6 CS3D VG SCIENTIFIC

Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 3152
Step Size = 0.50 eV. 170 Scans of 50 channels at 50 ms per chan



GL-4-142B-R-B CM 15D/H MG300 NR
OPT SI2P+MECA
8H45 28 NOV 89

Pd/HZSM-5(A)

Sample No. 151A (2.93% Pd)

Prepared by gas phase adsorption

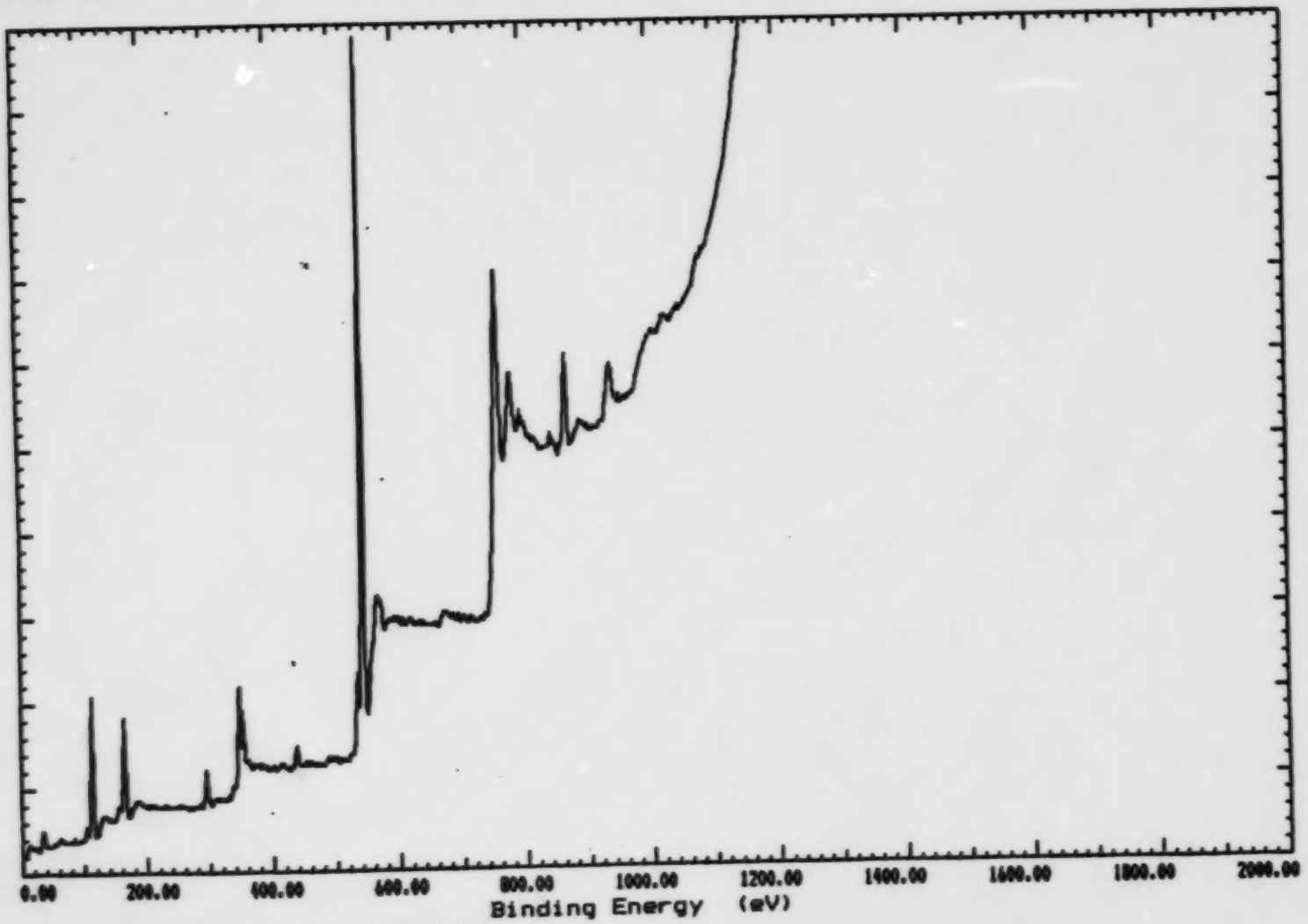
Pd/HZSM-5(A)

Sample No. 151A (2.93% Pd)

CALCINED

ASA7 Region 1 SURVEY VG SCIENTIFIC

Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 122382
Step Size = 1.00 eV. 7 Scans of 1150 channels at 50 ms per chan

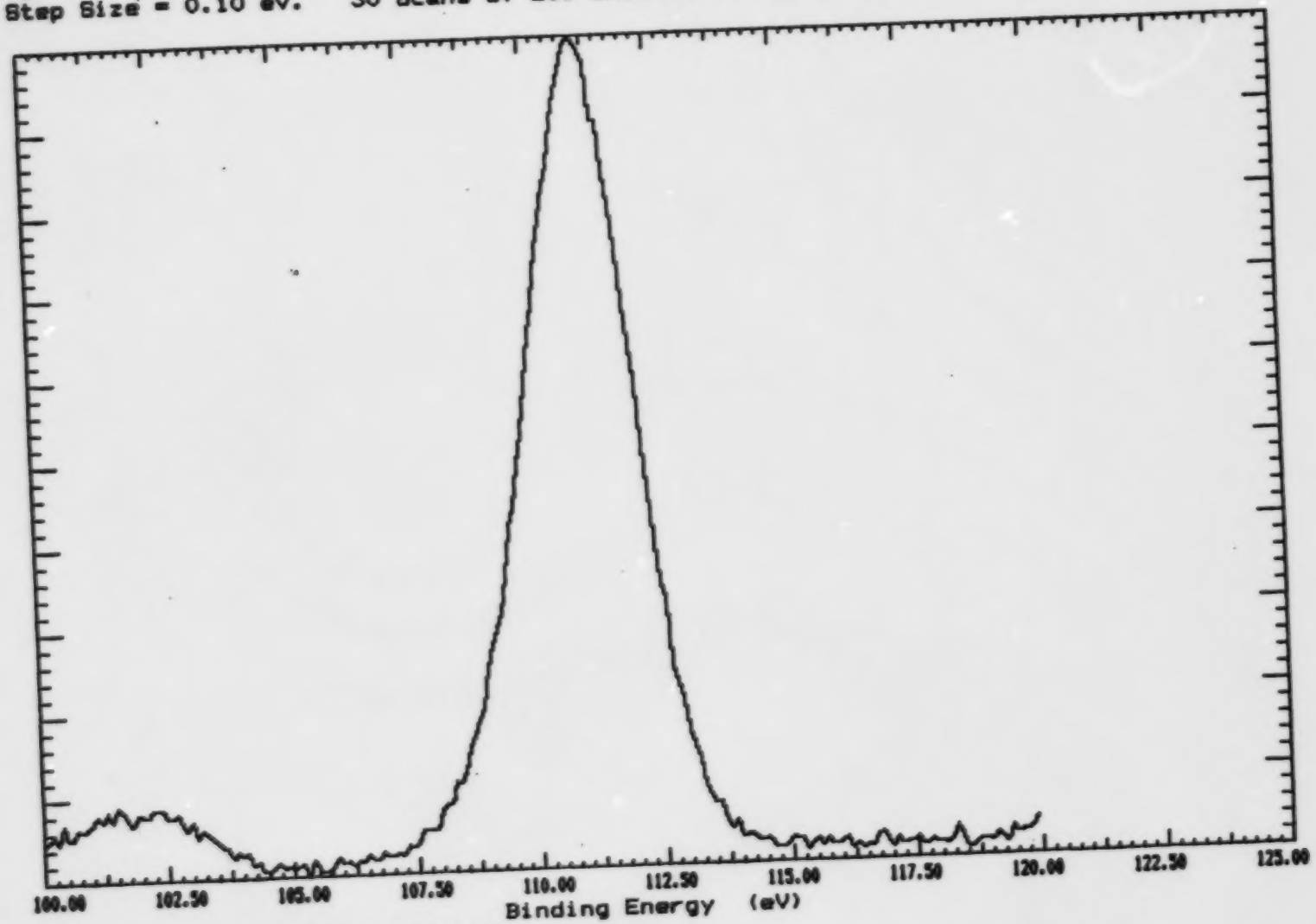


GL-4-151A-%PD CM 15D/H MG300 NR
OPT SI2P+MECA
16H35 24 NOV 89

ASA7 Region 2 SI2P

VG SCIENTIFIC

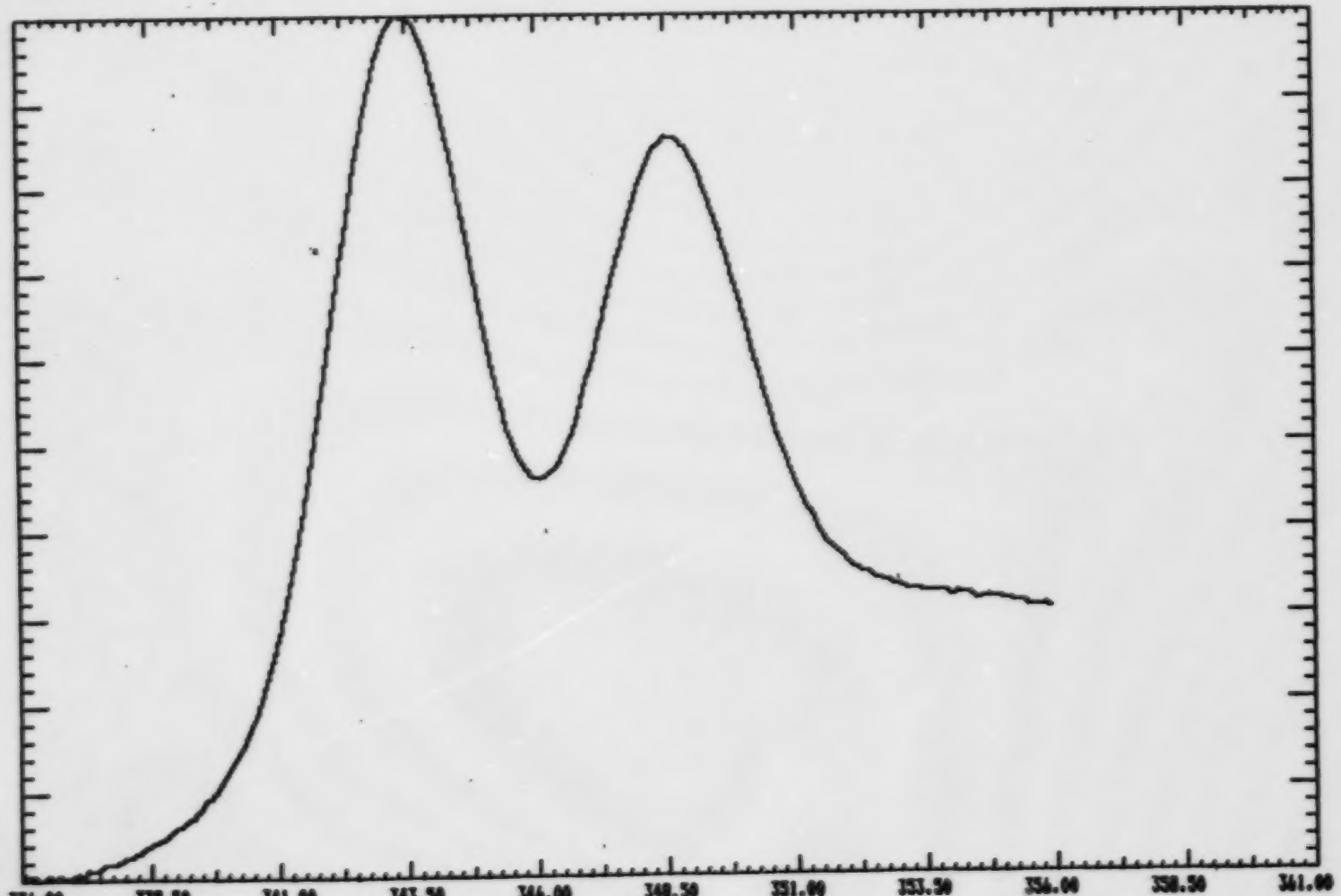
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 4931
Step Size = 0.10 eV. 30 Scans of 200 channels at 50 ms per chan



GL-4-151A-%PD CM 15D/H MB300 NR
OPT SI2P+MECA
16H35 24 NOV 89

ASA7 Region 3 PD3D VG SCIENTIFIC

Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 2917
Step Size = 0.10 eV. 3500 Scans of 200 channels at 50 ms per chan

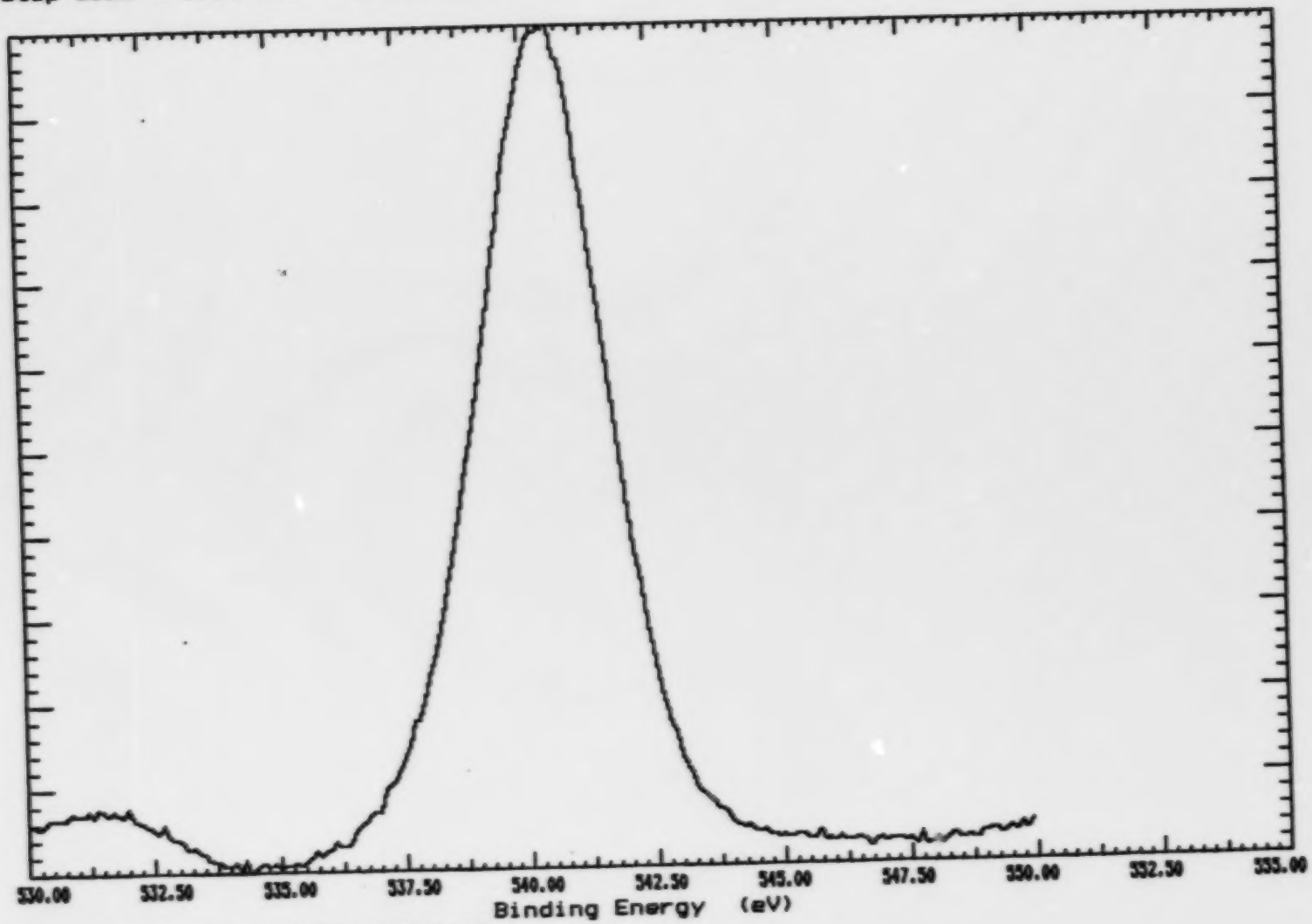


BL-4-151A-XPD CM 15D/H MG300 NR
OPT SI2P+MECA
16H35 24 NOV 89

ASA7 Region 4 O1S

VG SCIENTIFIC

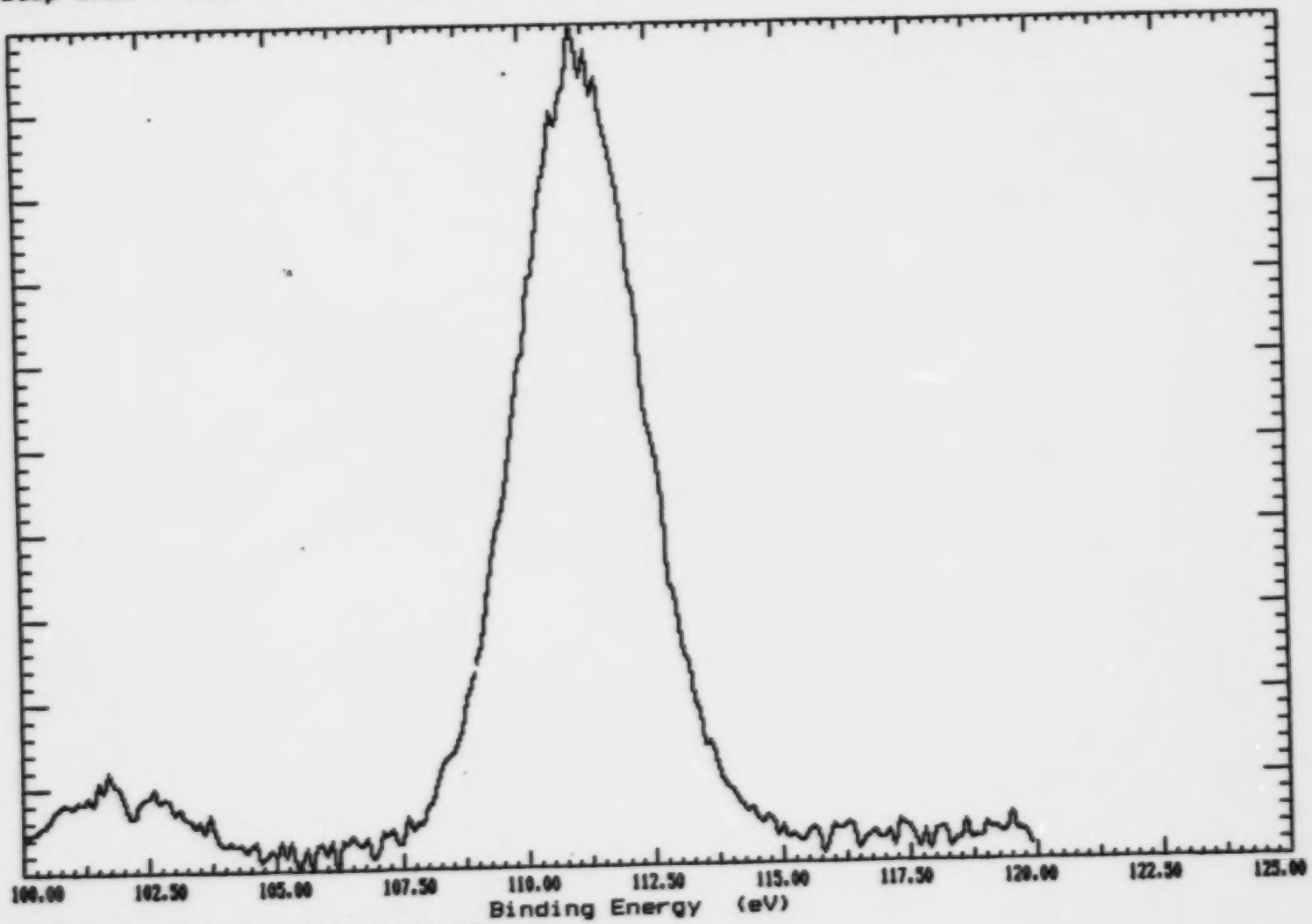
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 21482
Step Size = 0.10 eV. 20 Scans of 200 channels at 50 ms per chan



GL-4-151A-%PD CM 15D/H MG300 NR
OPT SI2P+MECA
16H35 24 NOV 89

ASA7 Region 5 SI2P VG SCIENTIFIC

Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 4102
Step Size = 0.10 eV. 15 Scans of 200 channels at 50 ms per chan

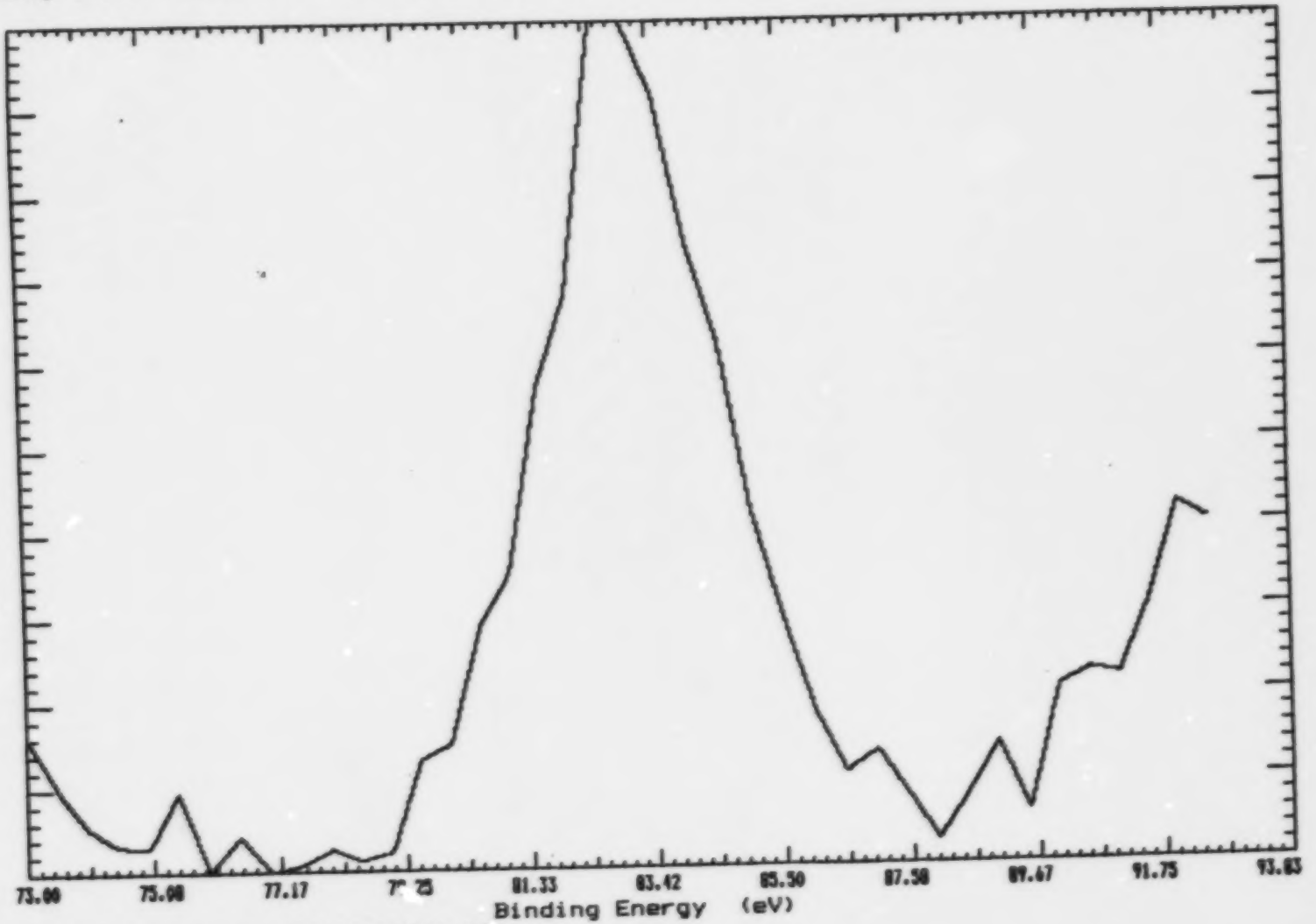


GL-4-151A-XPD CM 15D/H MG300 NR
OPT SI2P+MECA
16H35 24 NOV 89

ASA7 Region 6 AL2P

VG SCIENTIFIC

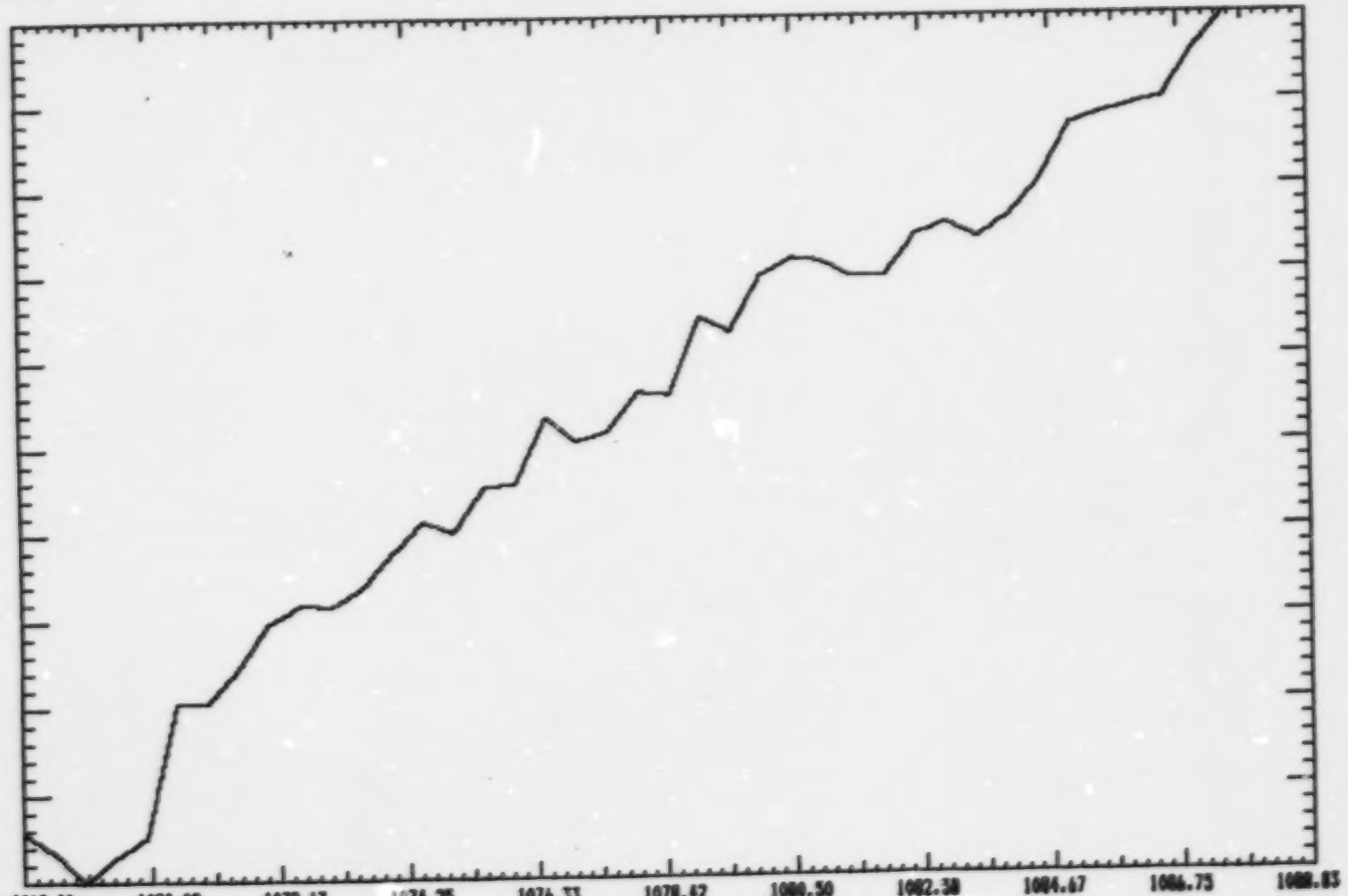
Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 659
Step Size = 0.50 eV. 150 Scans of 40 channels at 50 ms per chan



GL-4-151A-%PD CM 15D/H MG300 NR
OPT SI2P+MECA
16H35 24 NOV 89

ASA7 Region 7 NA1S VG SCIENTIFIC

Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 4630
Step Size = 0.50 eV. 100 Scans of 40 channels at 50 ms per chan



GL-4-151A-XPD CM 15D/H MG300 NR
OPT SI2P+MECA
16H35 24 NOV 89

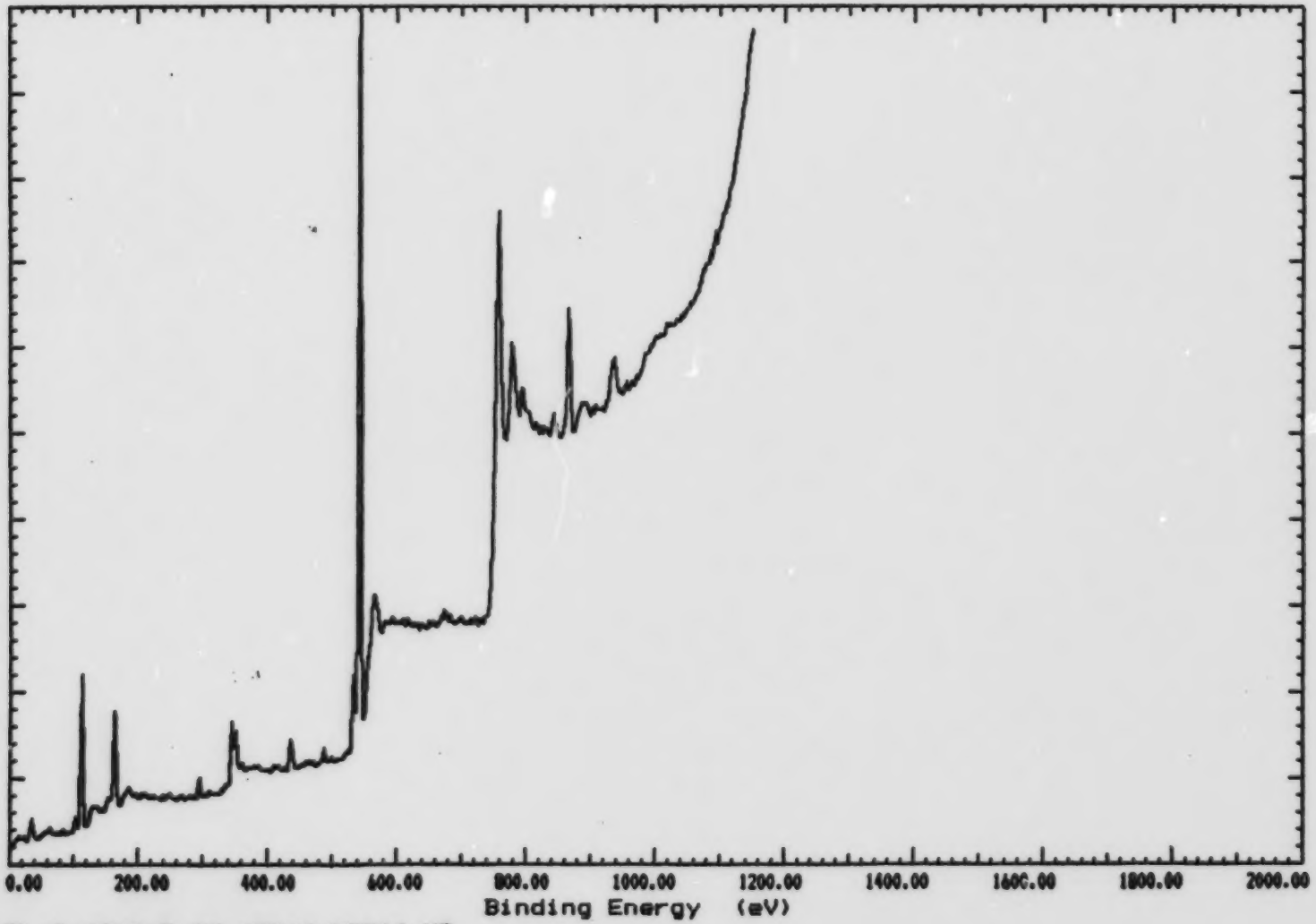
Pd/HZSM-5(A)

Sample No. 151A (2.93% Pd)

REDUCED

ASA10 Region 1 SURVEY VG SCIENTIFIC

Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 94119
Step Size = 1.00 eV. 7 Scans of 1150 channels at 50 ms per chan

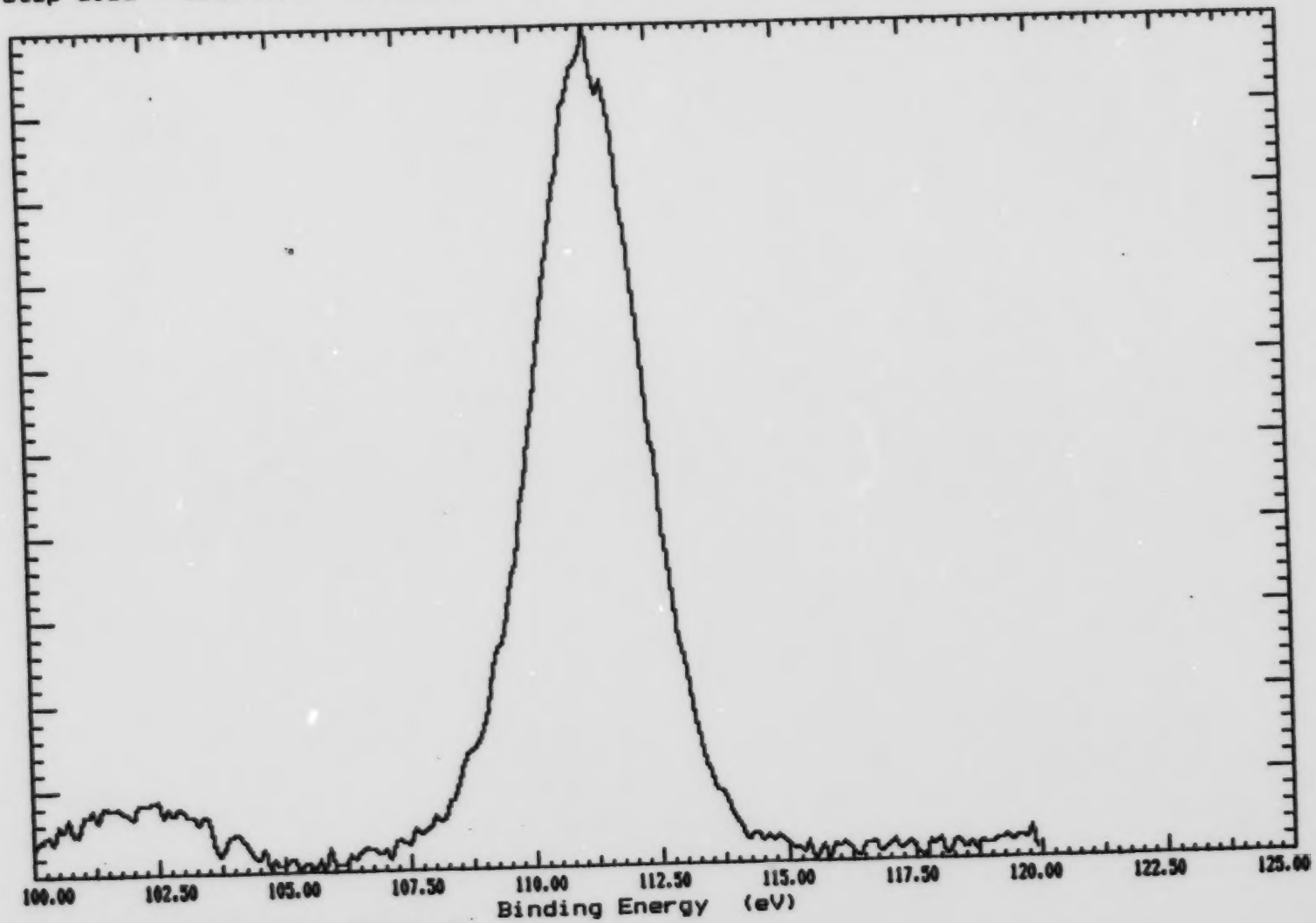


GL-4-151A-R CM 15D/H MG300 NR
OPT SI2P +MECA
13H00 27 NOV 89

ASA10 Region 2 SI2P

VG SCIENTIFIC

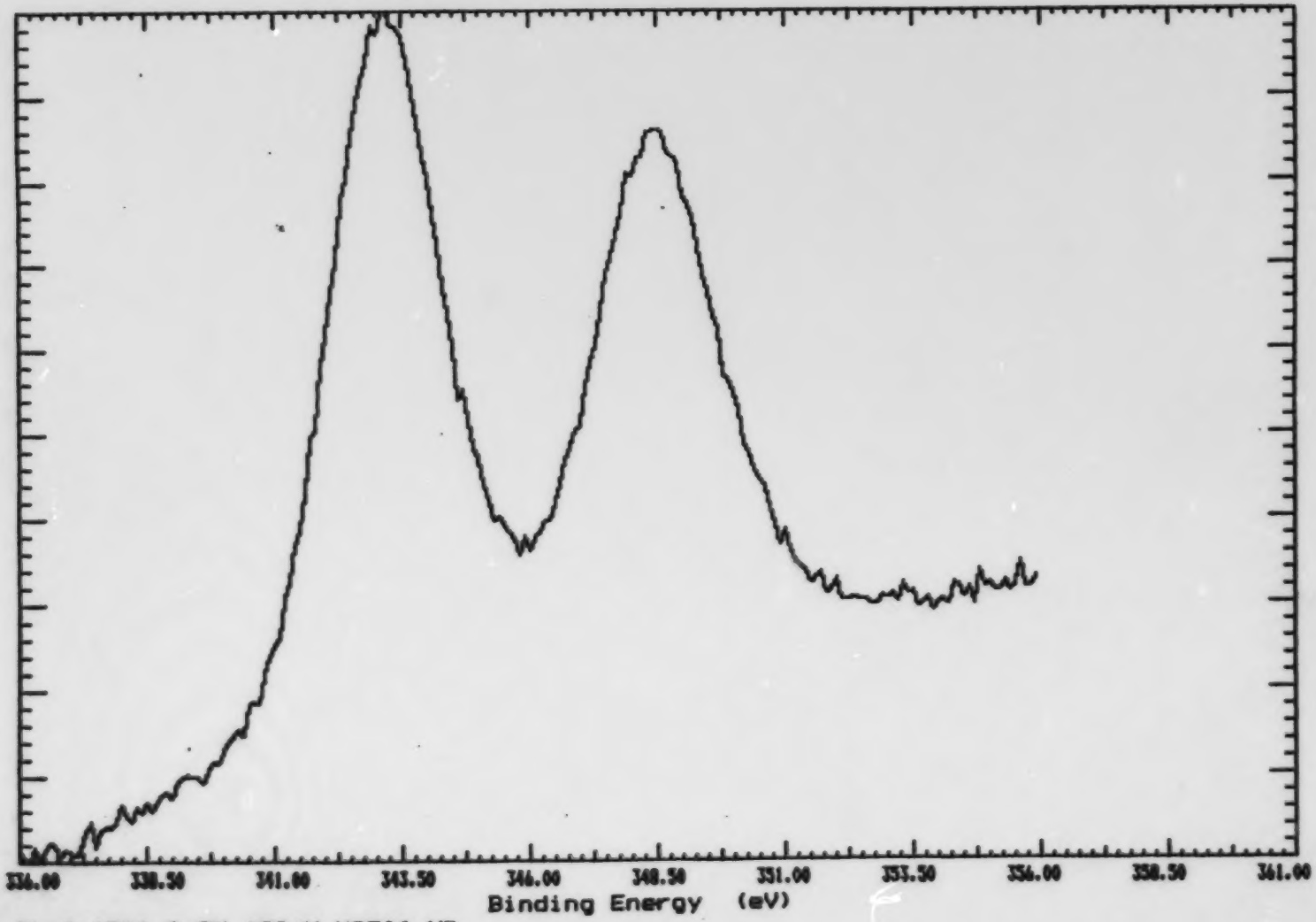
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 4024
Step Size = 0.10 eV. 30 Scans of 200 channels at 50 ms per chan



GL-4-151A-R CM 15D/H MG300 NR
OPT SI2P +MECA
13H00 27 NOV 89

ASA10 Region 3 PD3D VG SCIENTIFIC

Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 1681
Step Size = 0.10 eV. 200 Scans of 200 channels at 50 ms per chan

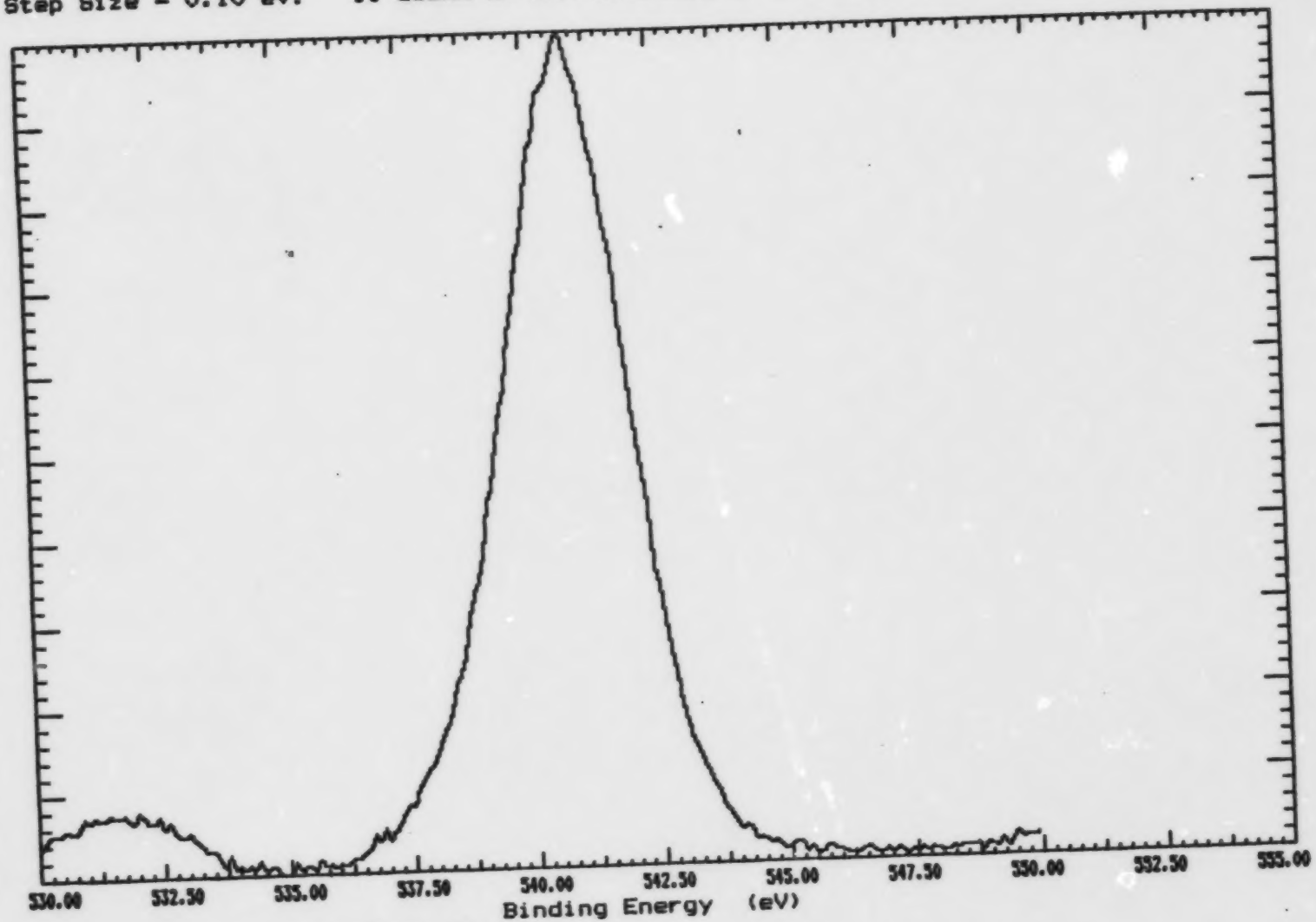


BL-4-151A-R CM 15D/H MG300 NR
OPT SI2P +MECA
13H00 27 NOV 89

ASA10 Region 4 O1S

VG SCIENTIFIC

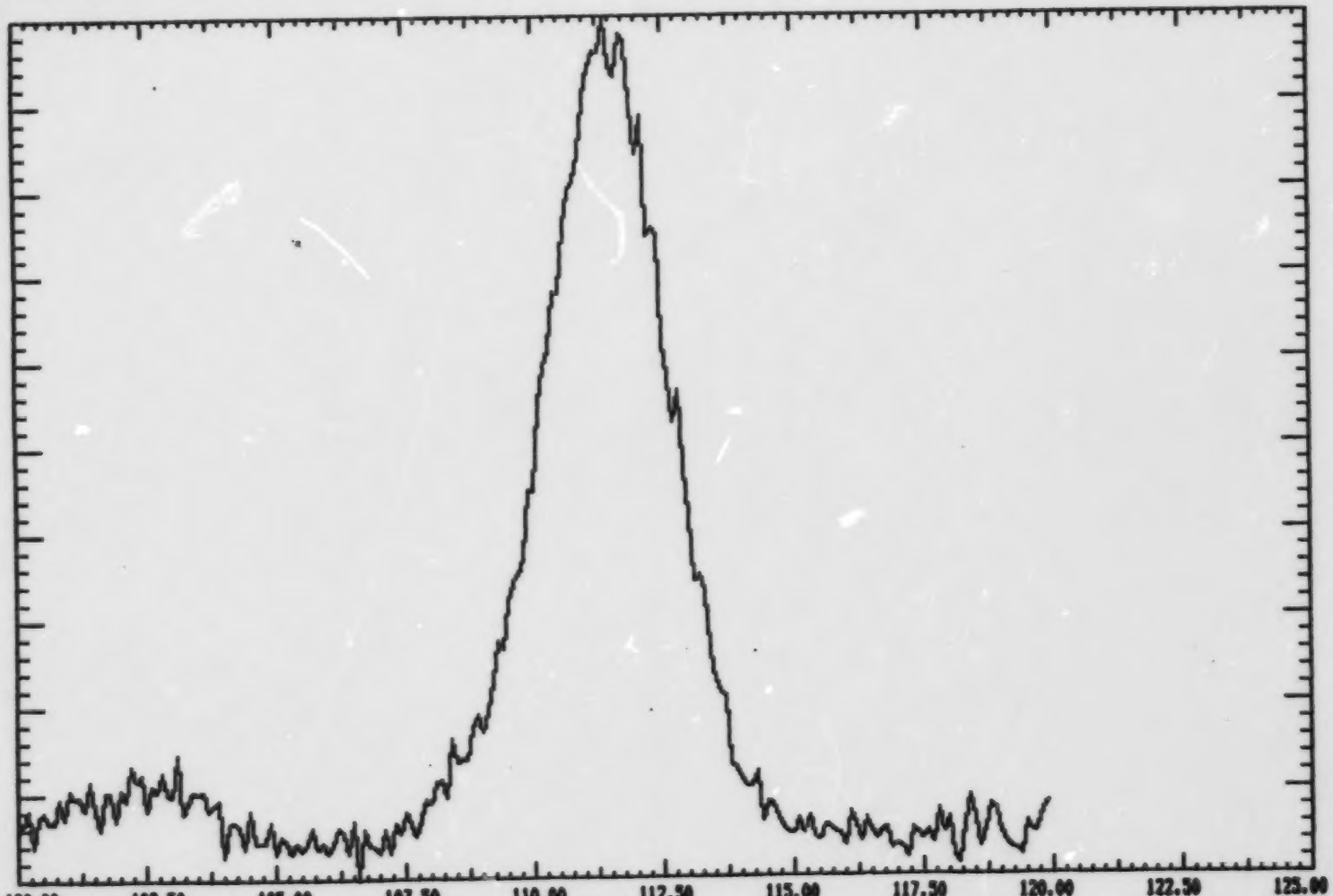
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 19730
Step Size = 0.10 eV. 11 Scans of 200 channels at 50 ms per chan



GL-4-151A-R CM 15D/H MG300 NR
OPT 8I2P +MECA
13H00 27 NOV 89

ASA10 Region 5 SI2P VG SCIENTIFIC

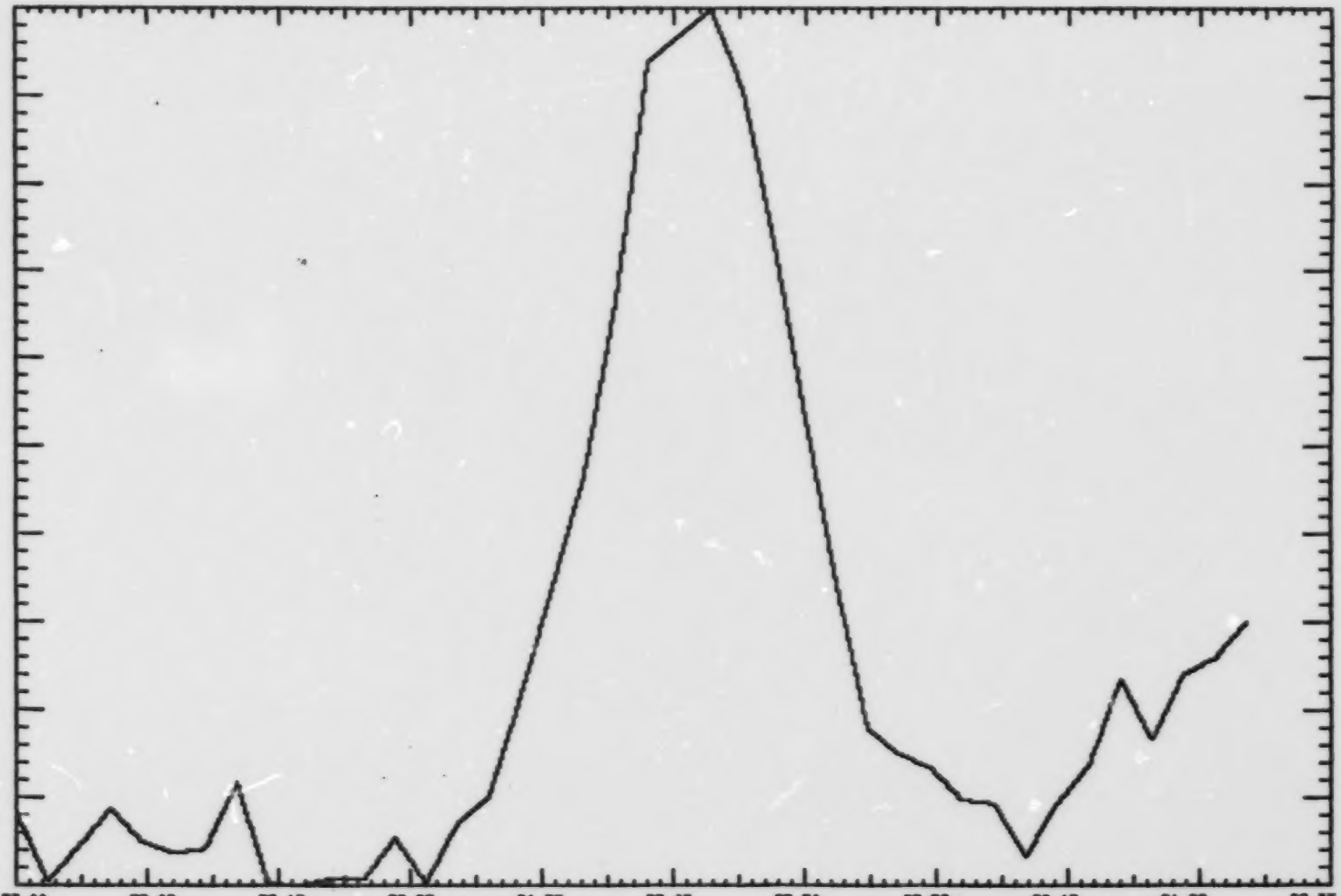
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 3855
Step Size = 0.10 eV. 5 Scans of 200 channels at 50 ms per chan



GL-4-151A-R CM 15D/H MG300 NR
OPT SI2P +MECA
13H00 27 NOV 89

ASA10 Region 6 AL2P VG SCIENTIFIC

Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 641
Step Size = 0.50 eV. 143 Scans of 40 channels at 50 ms per chan

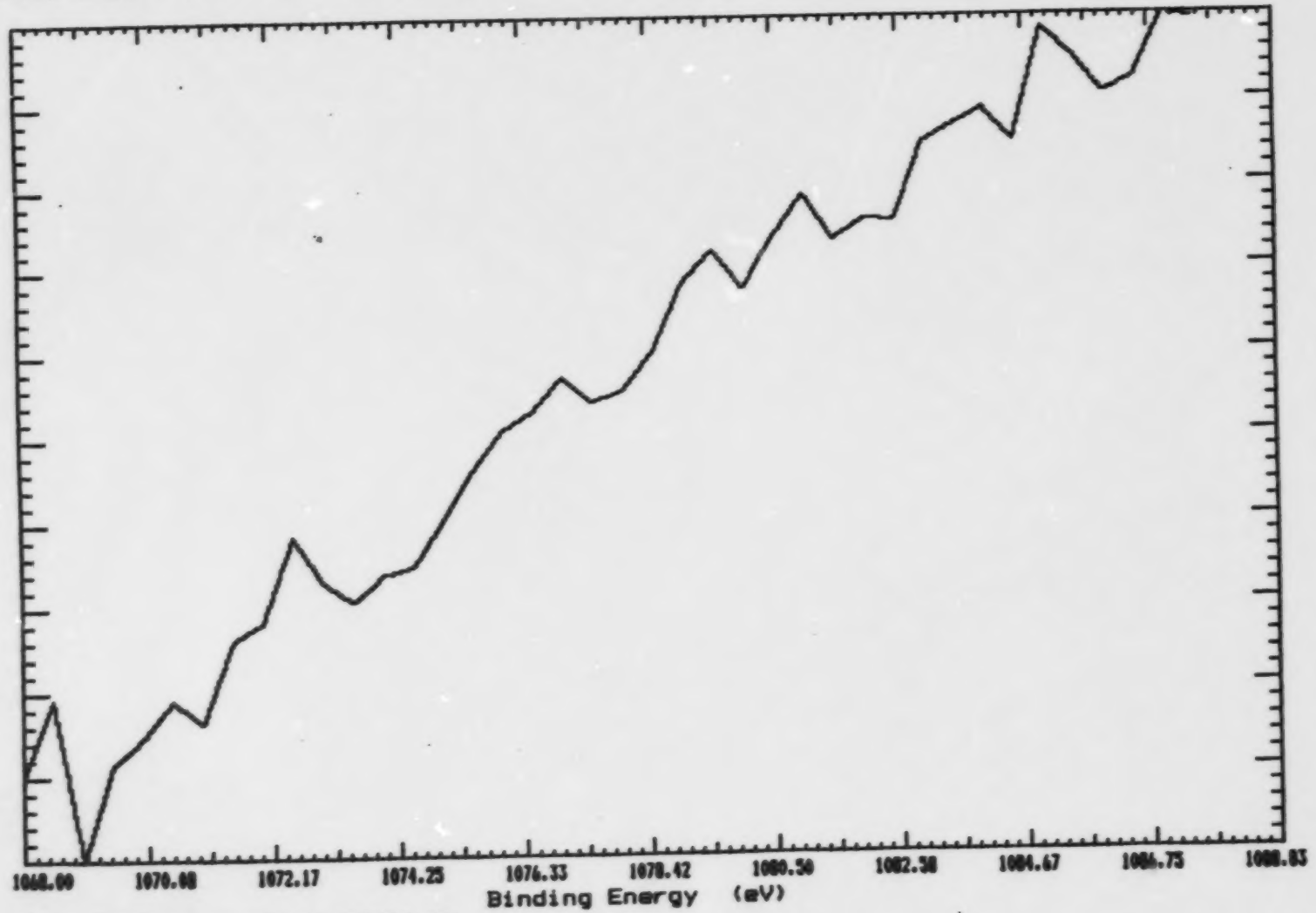


GL-4-151A-R CM 15D/H MG300 NR
OPT SI2P +MECA
13H00 27 NOV 89

ASA10 Region 7 NA1S

VG SCIENTIFIC

Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 3673
Step Size = 0.50 eV. 76 Scans of 40 channels at 50 ms per chan



GL-4-151A-R CM 15D/H MG300 NR
OPT SI2P +MECA
13H00 27 NOV 89

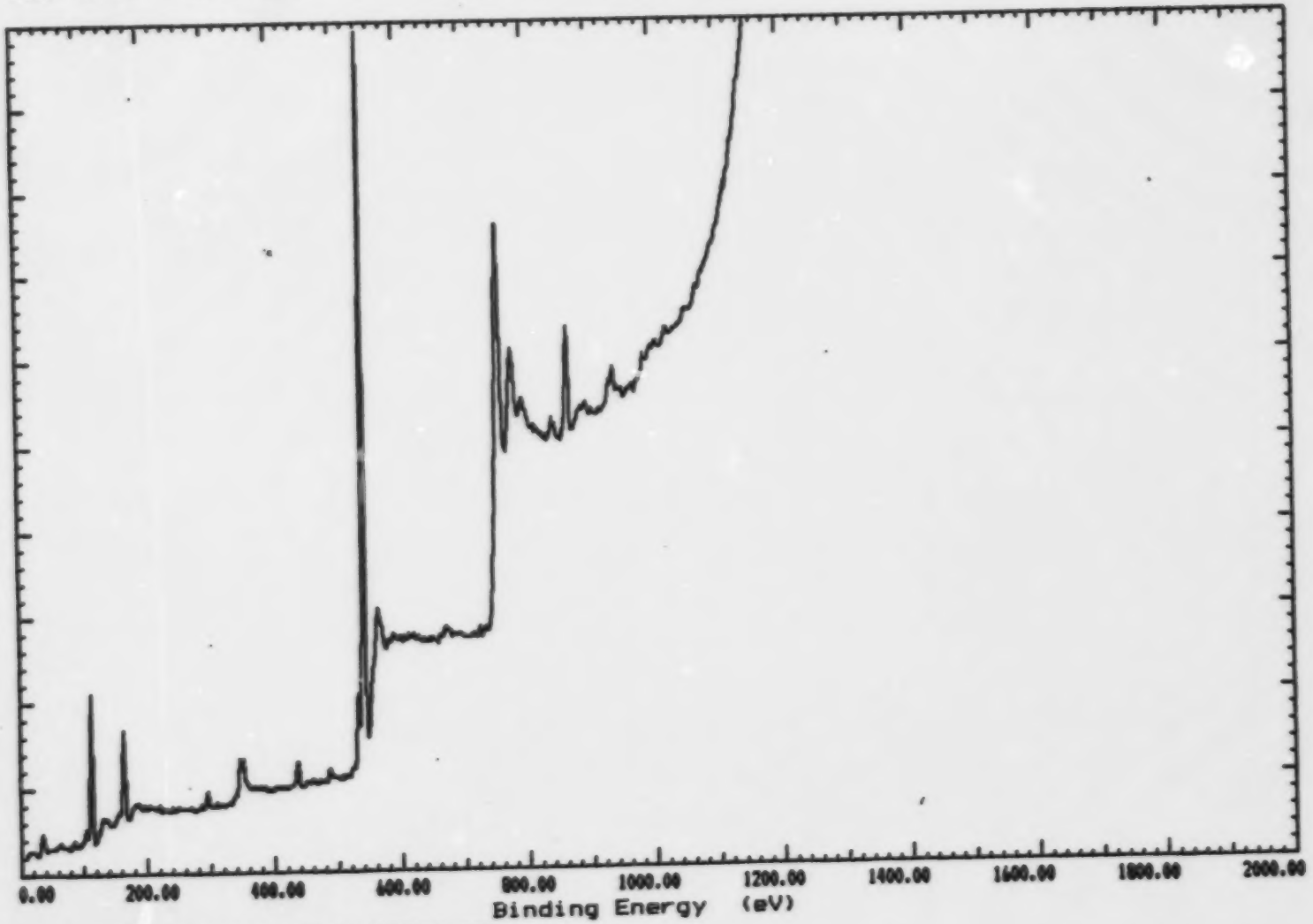
Pd/HZSM-5(A)

Sample No. 151A (2.93% Pd)

REDUCED AND GROUND

ASA8 Region 1 SURVEY VG SCIENTIFIC

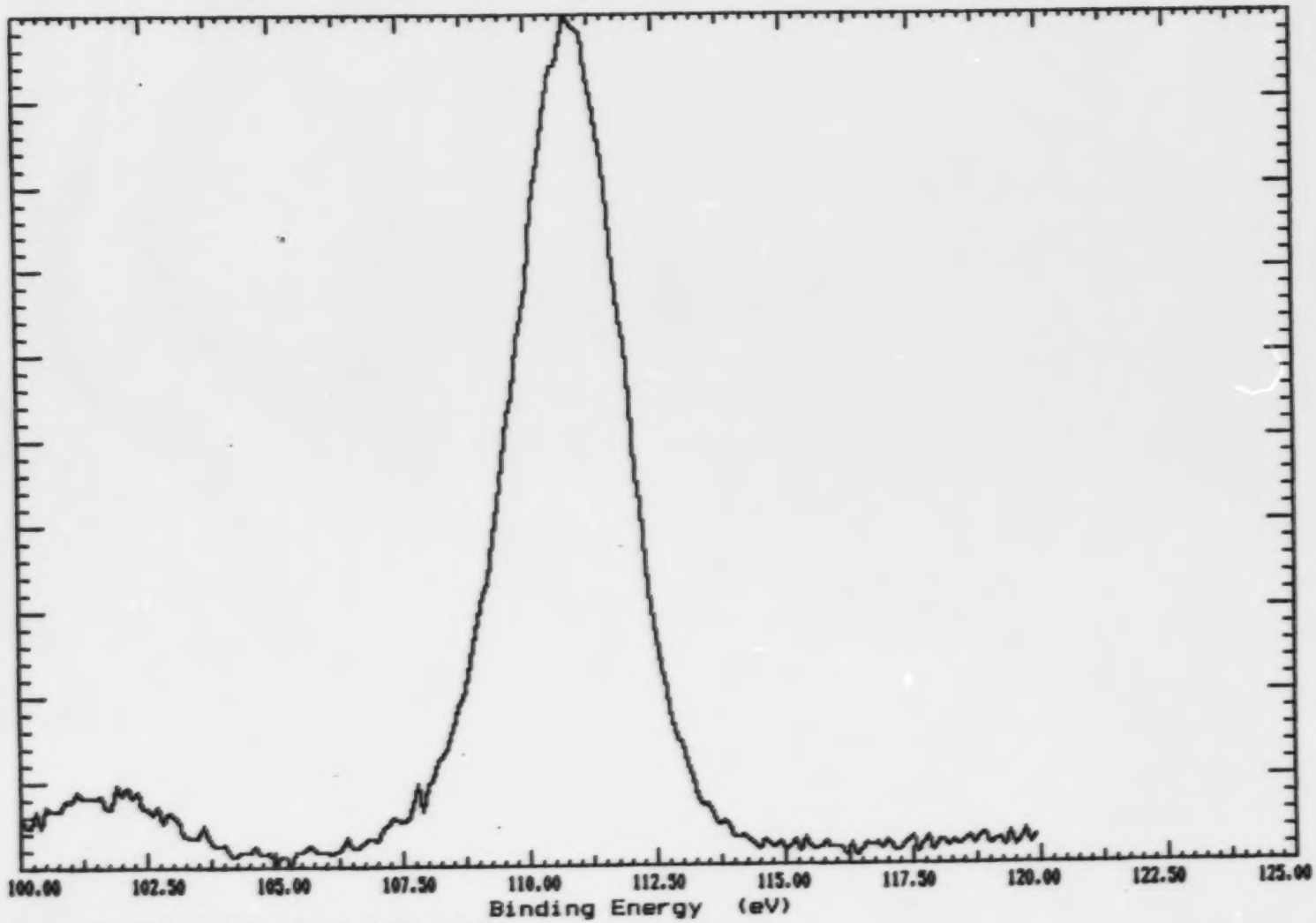
Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 85825
Step Size = 1.00 eV. 7 Scans of 1150 channels at 50 ms per chan



GL-4-151A-R-B CM 15D/H MG300 NR
OPT SI2P+MECA
BH50 27 NOV 89

ASA8 Region 2 SI2P VG SCIENTIFIC

Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 3401
Step Size = 0.10 eV. 30 Scans of 200 channels at 50 ms per chan

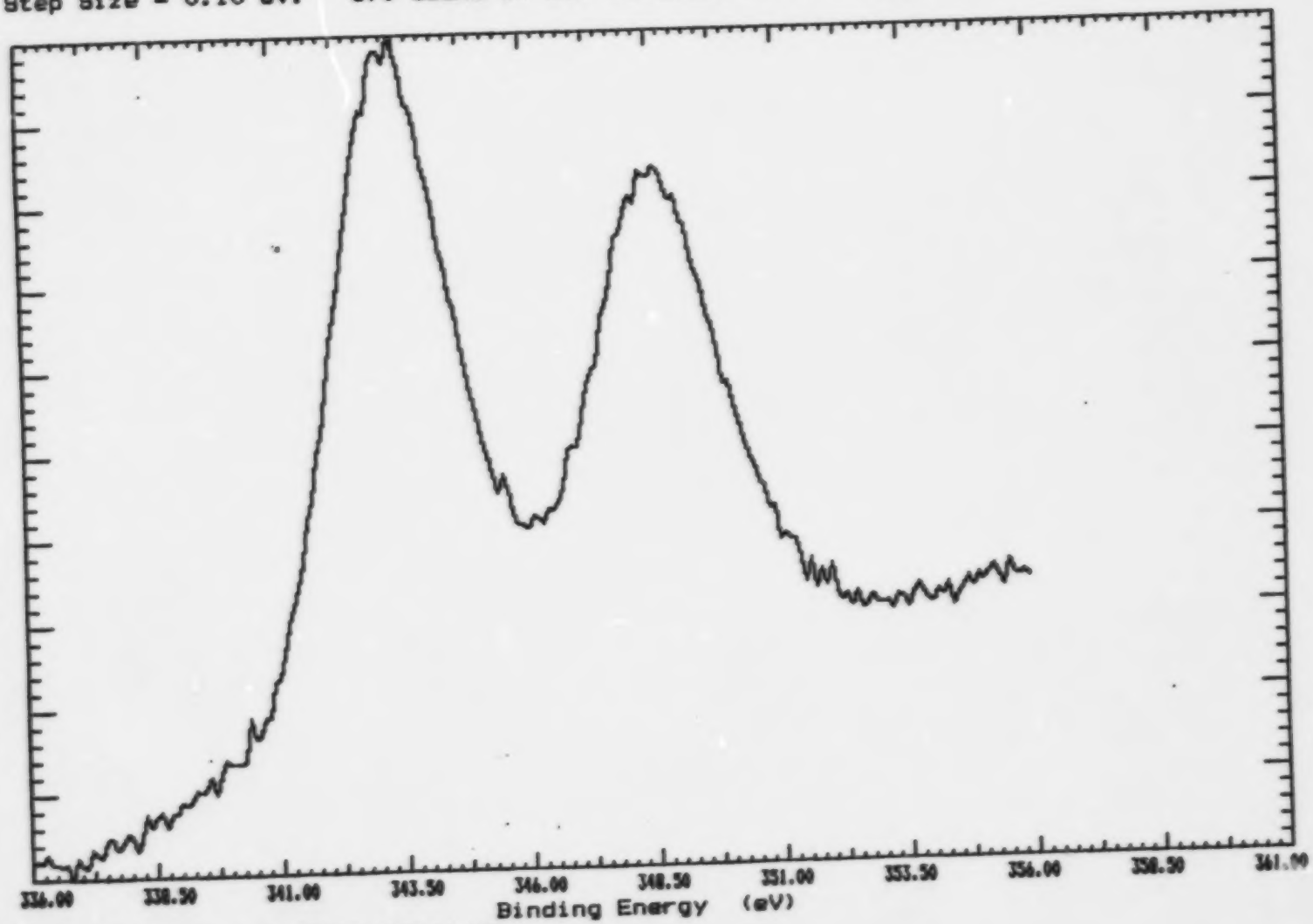


GL-4-151A-R-B CM 15D/H MG300 NR
OPT SI2P+MECA
8H50 27 NOV 89

ASA8 Region 3 PD3D

VG SCIENTIFIC

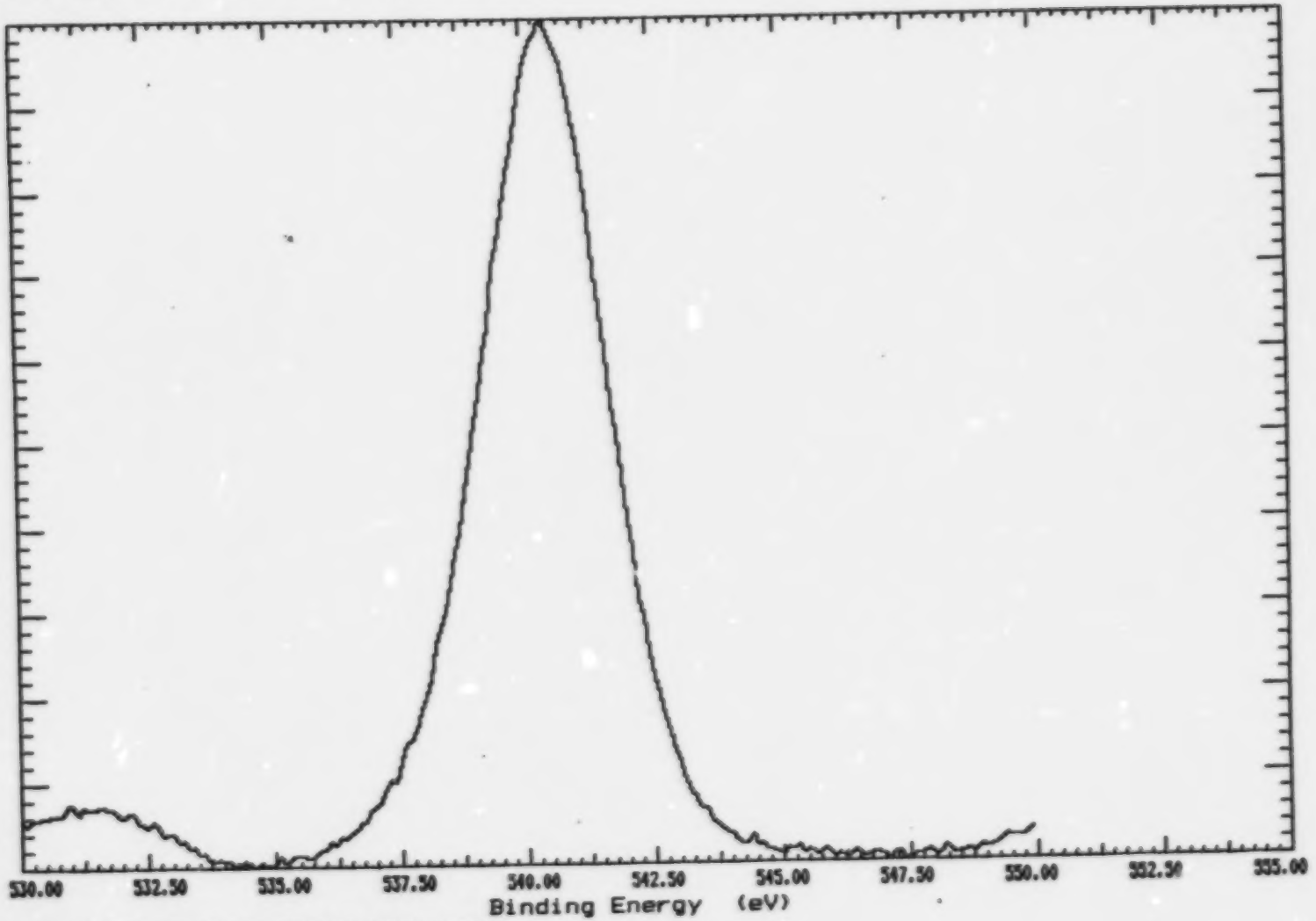
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 1051
Step Size = 0.10 eV. 370 Scans of 200 channels at 50 ms per chan



GL-4-151A-R-B CM 15D/H MG300 NR
OPT SI2P+MECA
BH50 27 NOV 89

ASAB Region 4 O1S VG SCIENTIFIC

Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 17571
Step Size = 0.10 eV. 20 Scans of 200 channels at 50 ms per chan

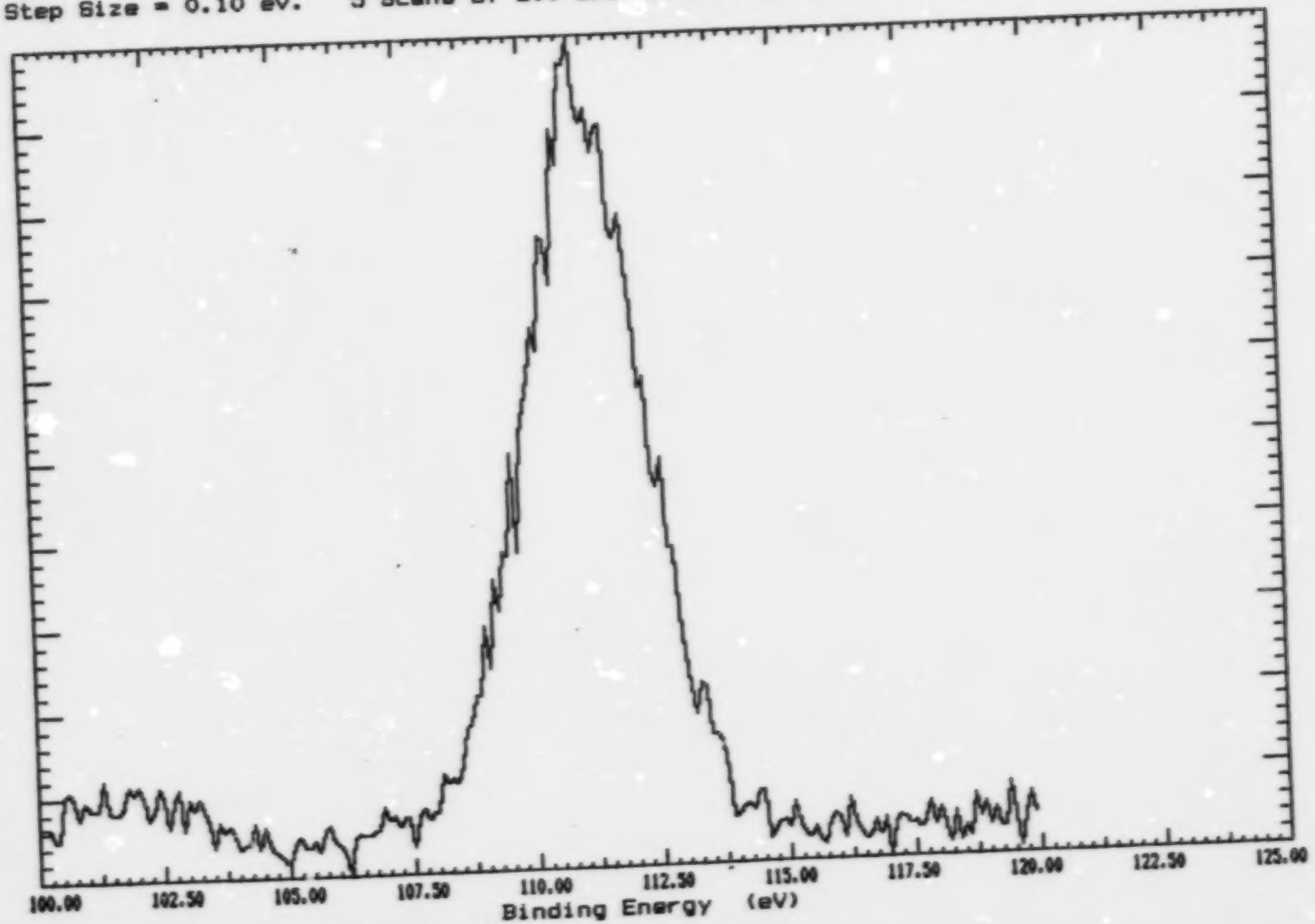


GL-4-151A-R-B CM 15D/H MG300 NR
OPT SI2P+MECA
BH50 27 NOV 89

ASA8 Region 5 SI2P

VG SCIENTIFIC

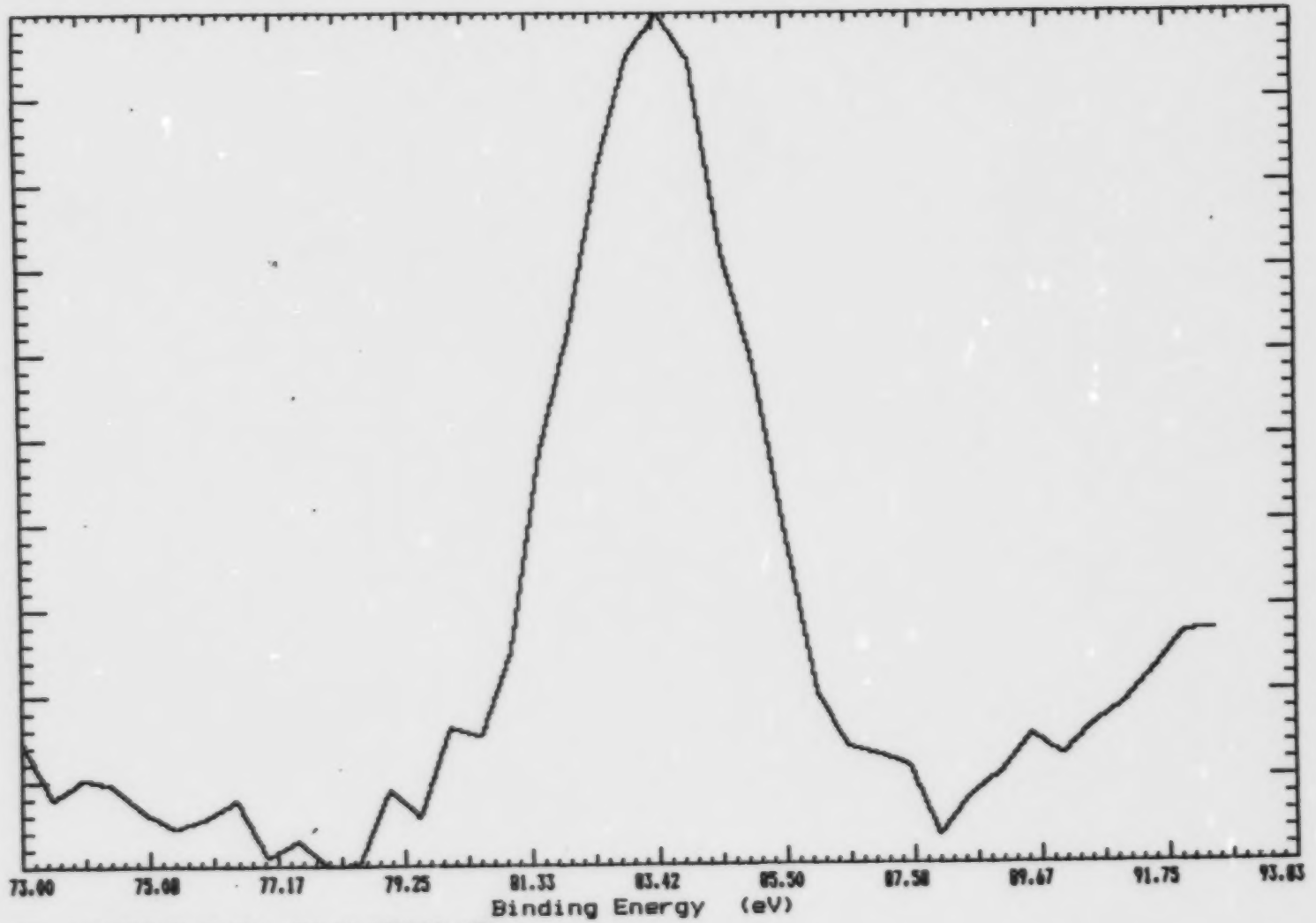
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 3535
Step Size = 0.10 eV. 5 Scans of 200 channels at 50 ms per chan



GL-4-151A-R-B CM 15D/H MG300 NR
OPT SI2P+MECA
BH50 27 NOV 89

ASA8 Region 6 AL2P VG SCIENTIFIC

Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 696
Step Size = 0.50 eV. 116 Scans of 40 channels at 50 ms per chan

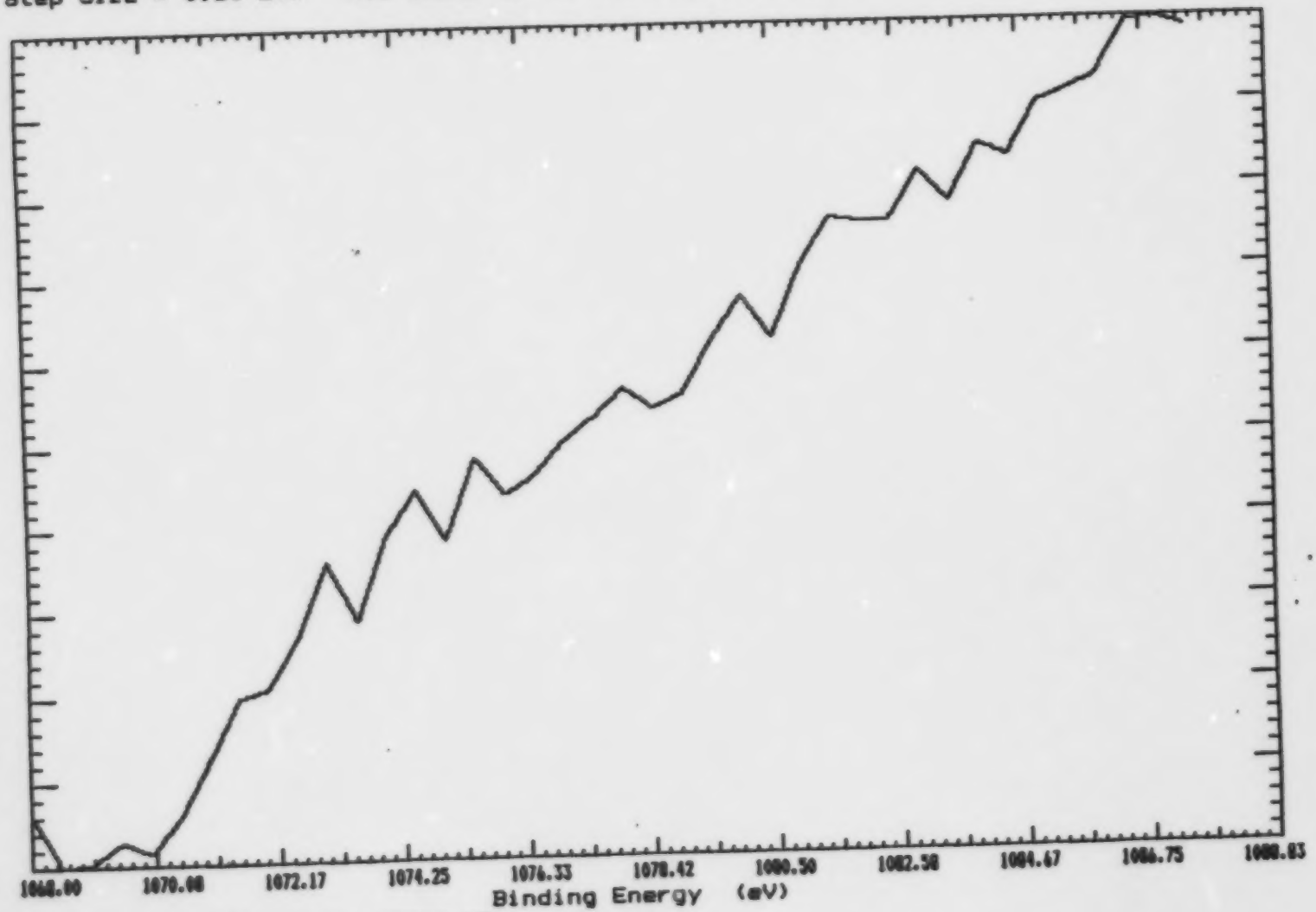


GL-4-151A-R-B CM 15D/H MG300 NR
OPT BI2P+MECA
8H50 27 NOV 89

ASA8 Region 7 NA1S

VG SCIENTIFIC

Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 3340
Step Size = 0.50 eV. 100 Scans of 40 channels at 50 ms per chan



GL-4-151A-R-B CM 15D/H MG300 NR
OPT SI2P+MECA
BH50 27 NOV 89

Pd/HZSM-5(B)

Sample No. 151B (2.98% Pd)

Prepared by gas phase adsorption

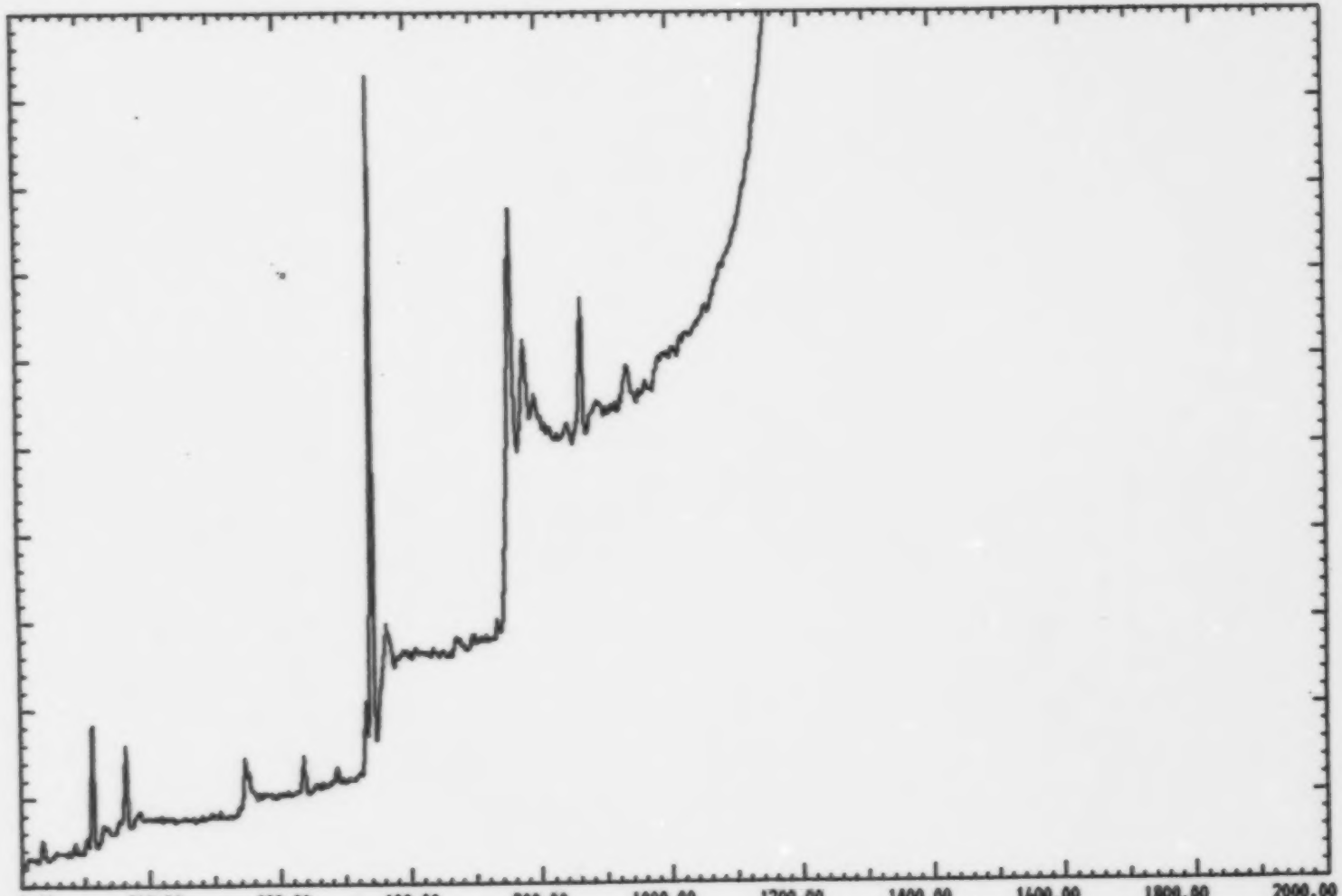
Pd/HZSM-5(B)

Sample No. 151B (2.98% Pd)

CALCINED

ASA16 Region 1 SURVEY VG SCIENTIFIC

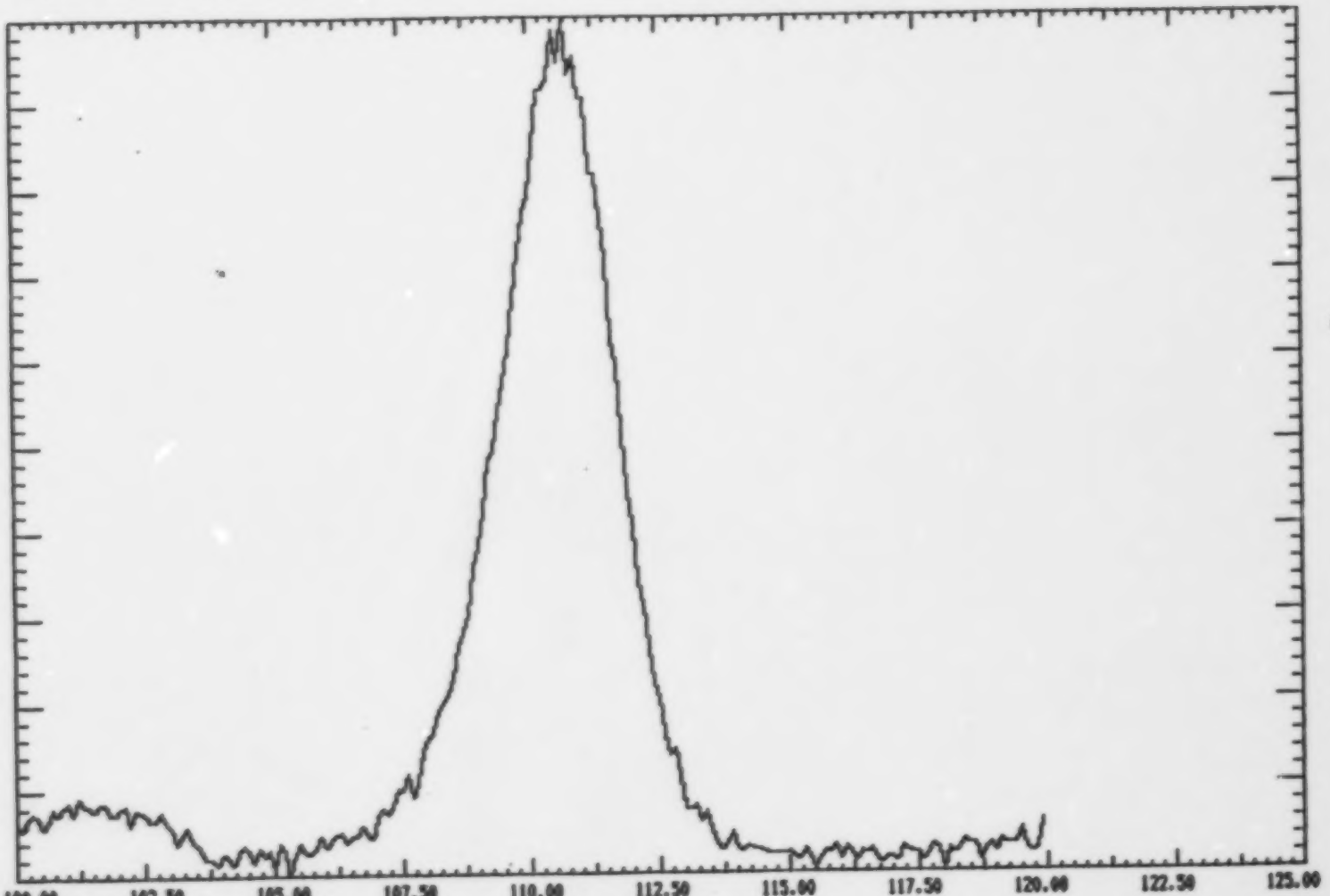
Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 65248
Step Size = 1.00 eV. 7 Scans of 1150 channels at 50 ms per chan



AS. GL-4-142-B REPRISE CM 15D/H
MG300W NR
29 NOV.89 15H19

ASA18 Region 2 SI2P VG SCIENTIFIC

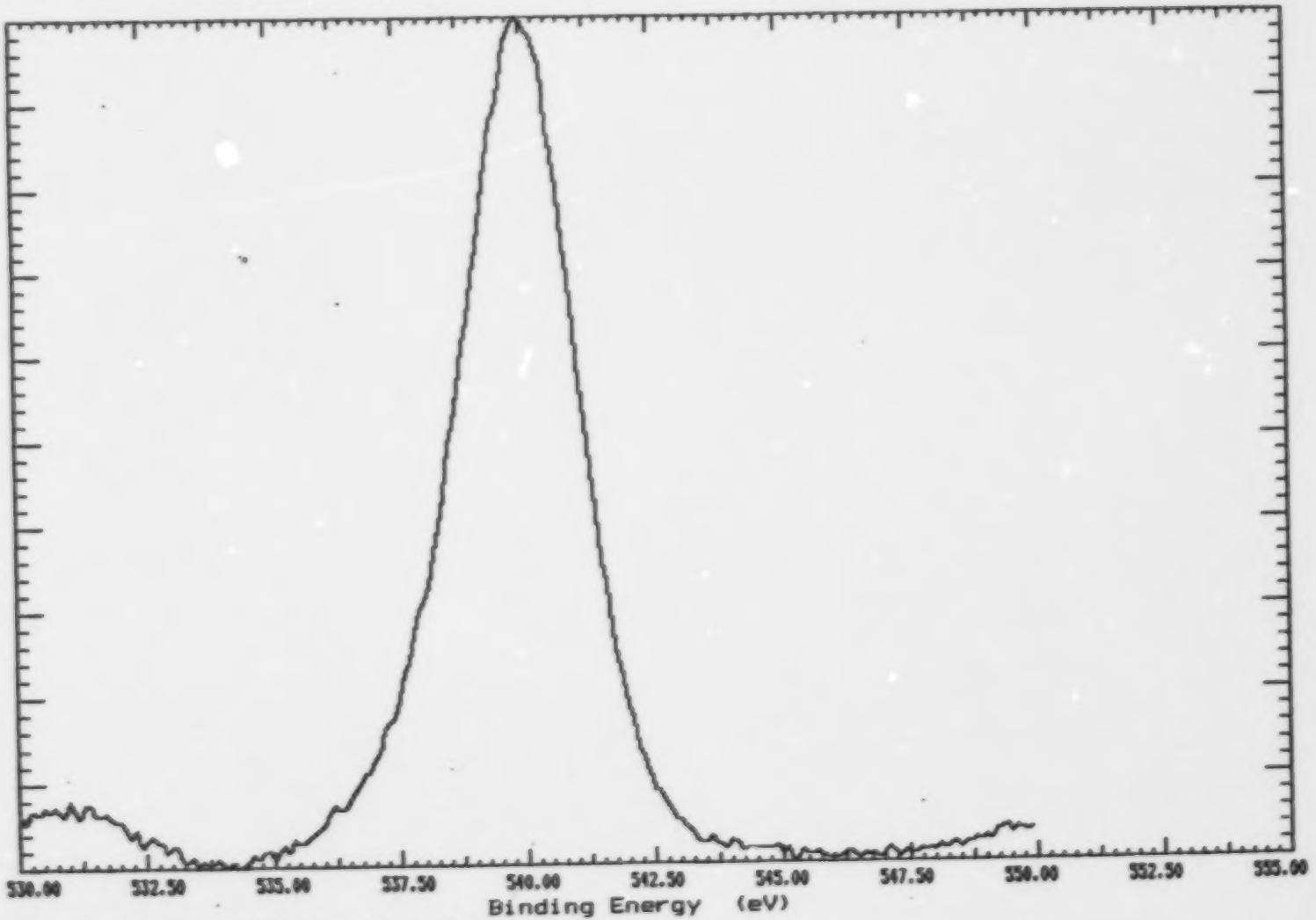
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 2297
Step Size = 0.10 eV. 40 Scans of 200 channels at 50 ms per chan



AS. GL-4-142-B REPRISE CM 15D/H
MB300W NR
29 NOV.89 15H19

ASA18 Region 3 01S VG SCIENTIFIC

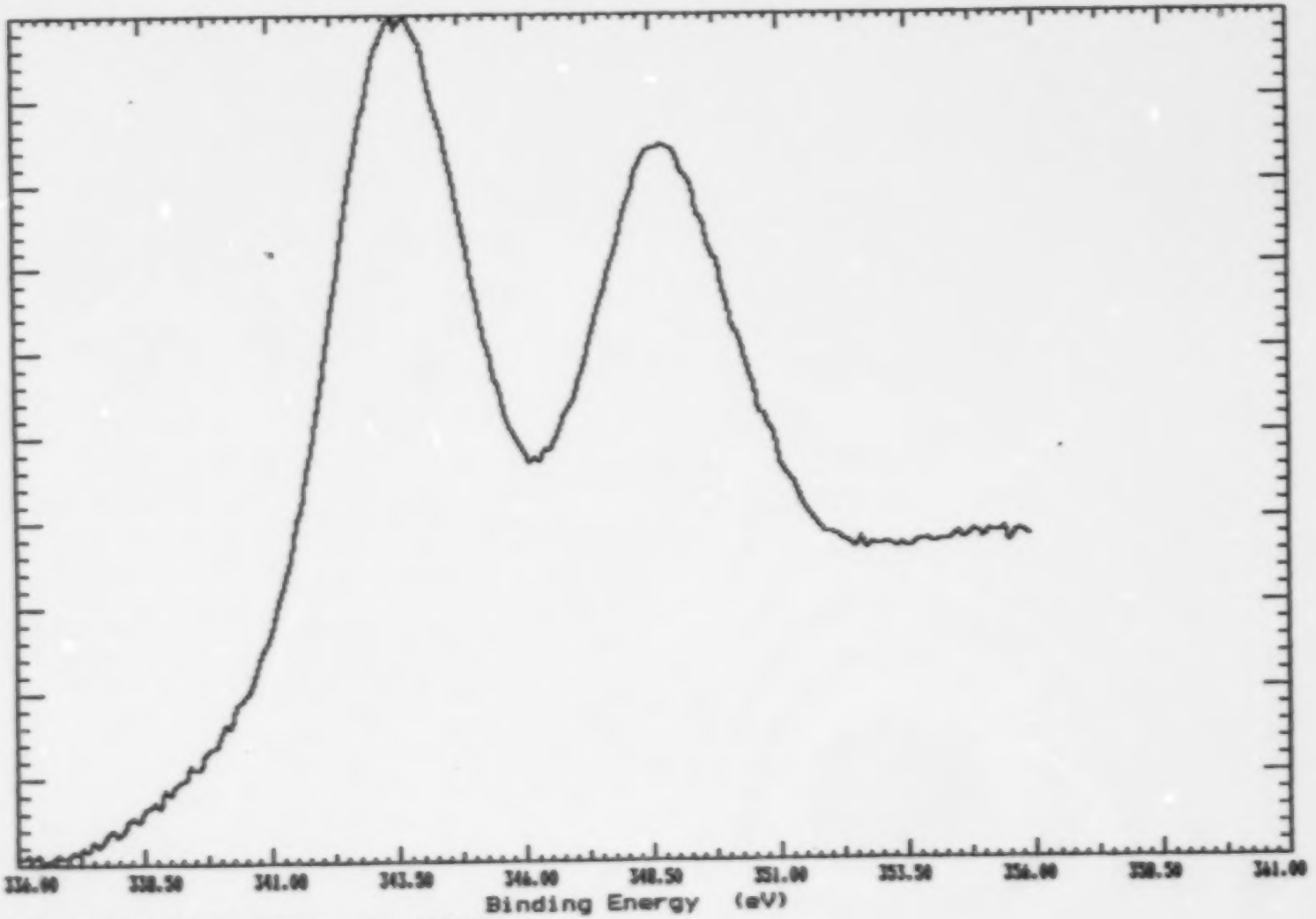
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 12026
Step Size = 0.10 eV. 20 Scans of 200 channels at 50 ms per chan



AS. GL-4-142-B REPRISE CM 15D/H
MG300W NR
29 NOV.89 15H19

ASA18 Region 4 PD3D VG SCIENTIFIC

Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 802
Step Size = 0.10 eV. 2000 Scans of 200 channels at 50 ms per chan

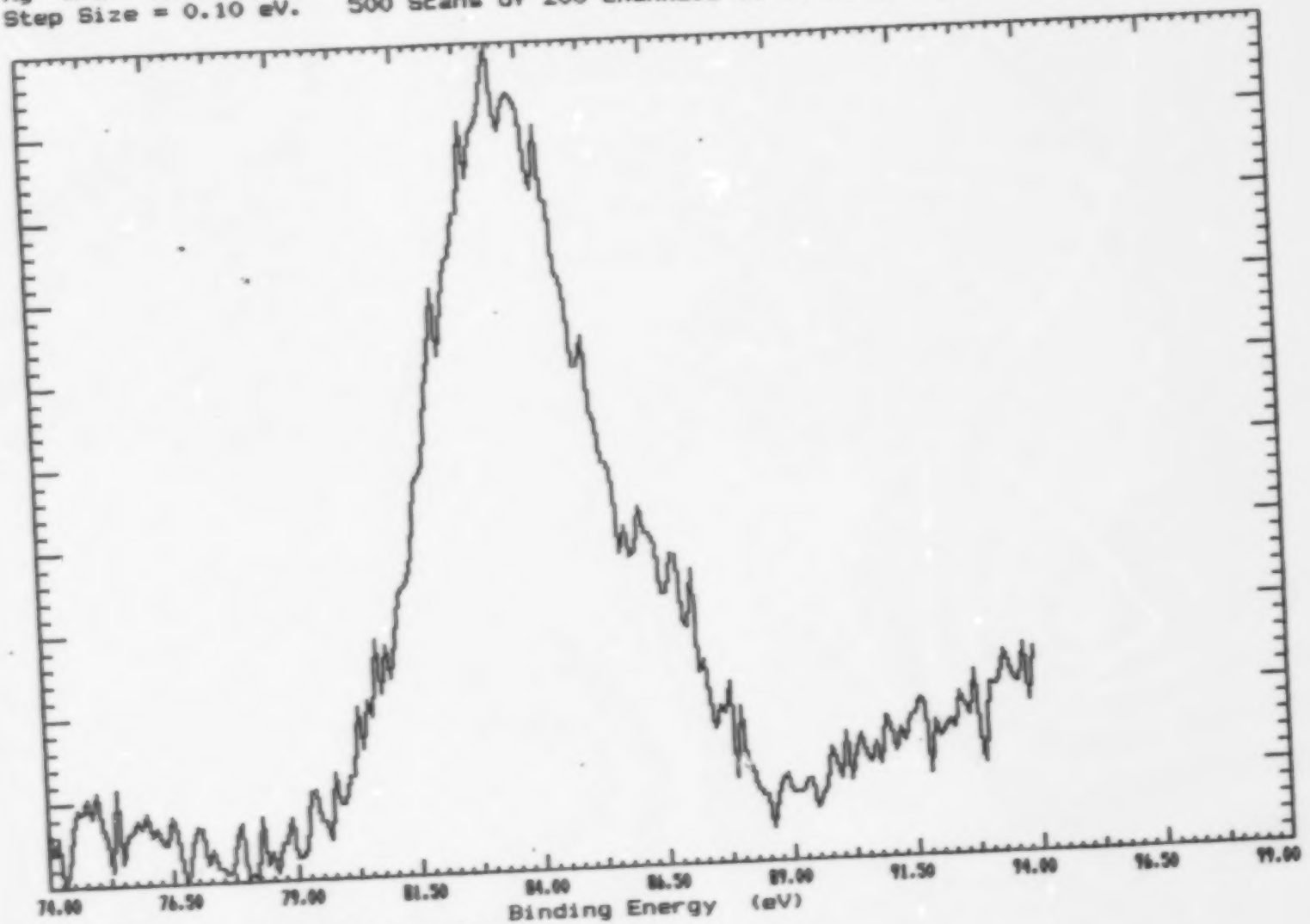


AS. GL-4-142-B REPRISE CM 15D/H
MB300W NR
29 NOV.89 15H19

VG SCIENTIFIC

ASA18 Region 5 ALCS

Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 166
Step Size = 0.10 eV. 500 Scans of 200 channels at 50 ms per chan

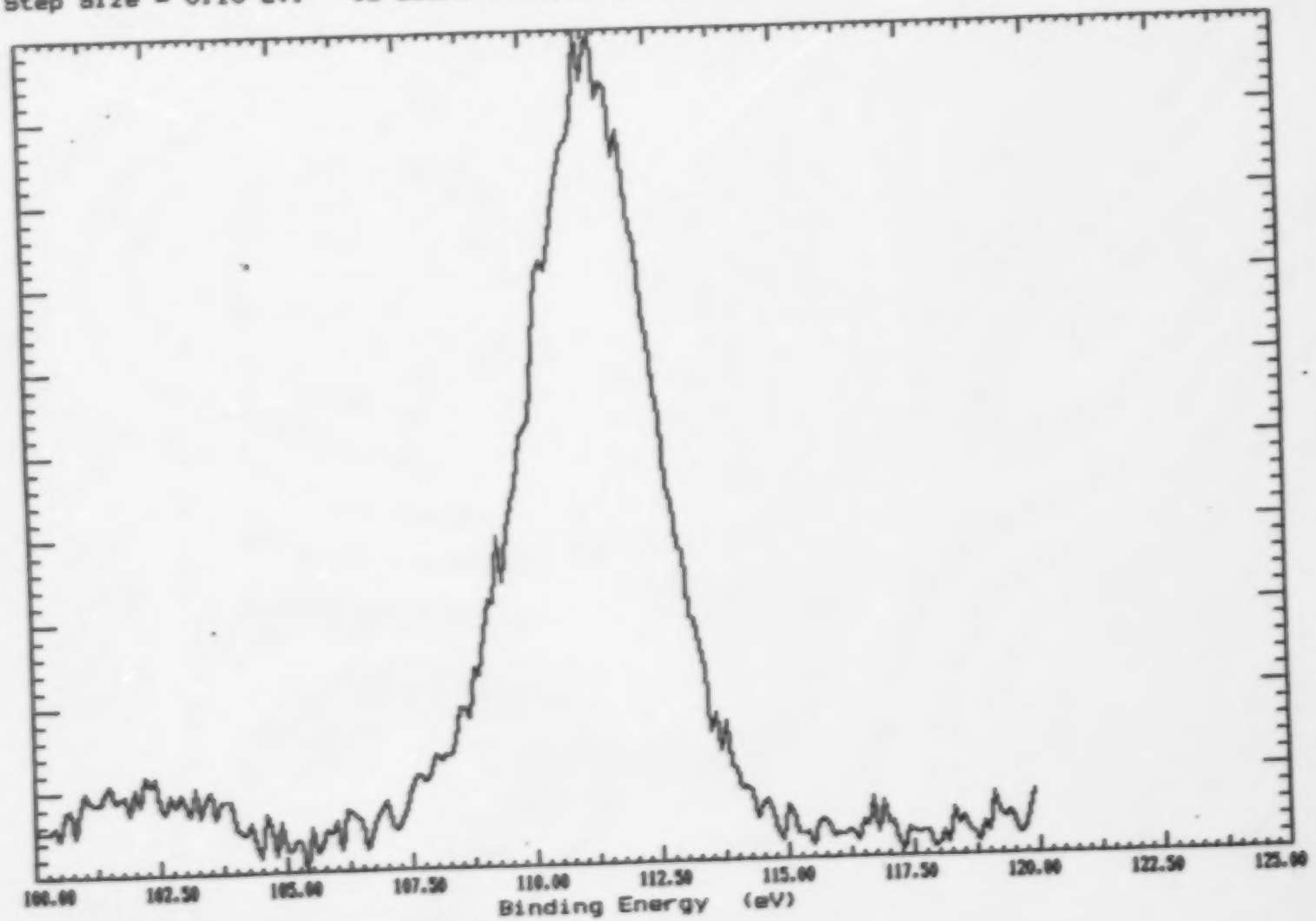


AS. GL-4-142-B REPRISE CM 15D/H
MG300W NR
29 NOV.89 15H19

ASA18 Region 6 SI2P

VG SCIENTIFIC

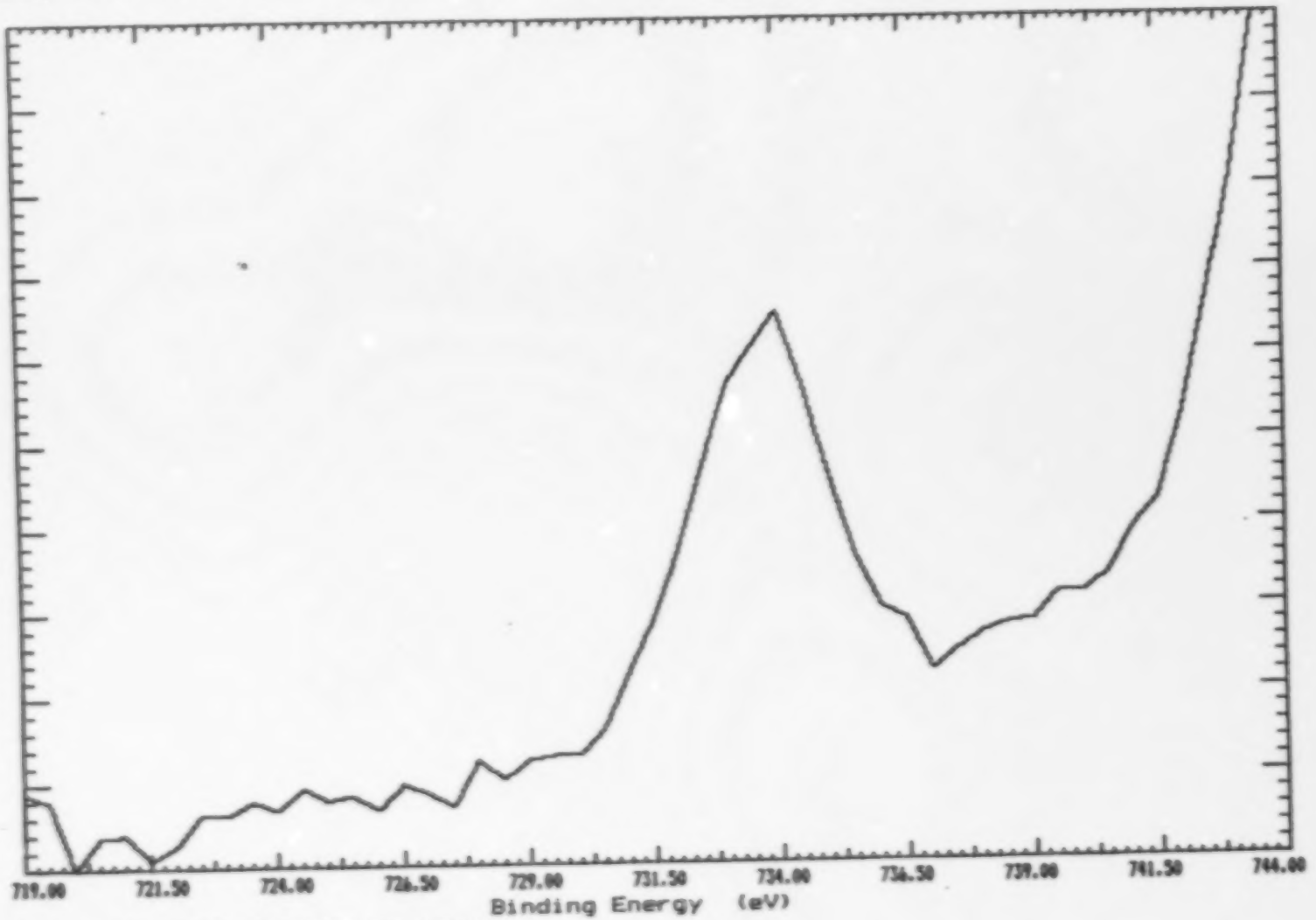
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 2106
Step Size = 0.10 eV. 15 Scans of 200 channels at 50 ms per chan



AB. BL-4-142-B REPRISE CM 15D/H
MG300W NR
29 NOV.89 15H19

ASA18 Region 7 CS3D VG SCIENTIFIC

Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 3038
Step Size = 0.50 eV. 200 Scans of 50 channels at 50 ms per chan



AS. GL-4-142-B REPRISE CM 15D/H
MB300W NR
29 NOV.89 15H19

Pd/HZSM-5(B)

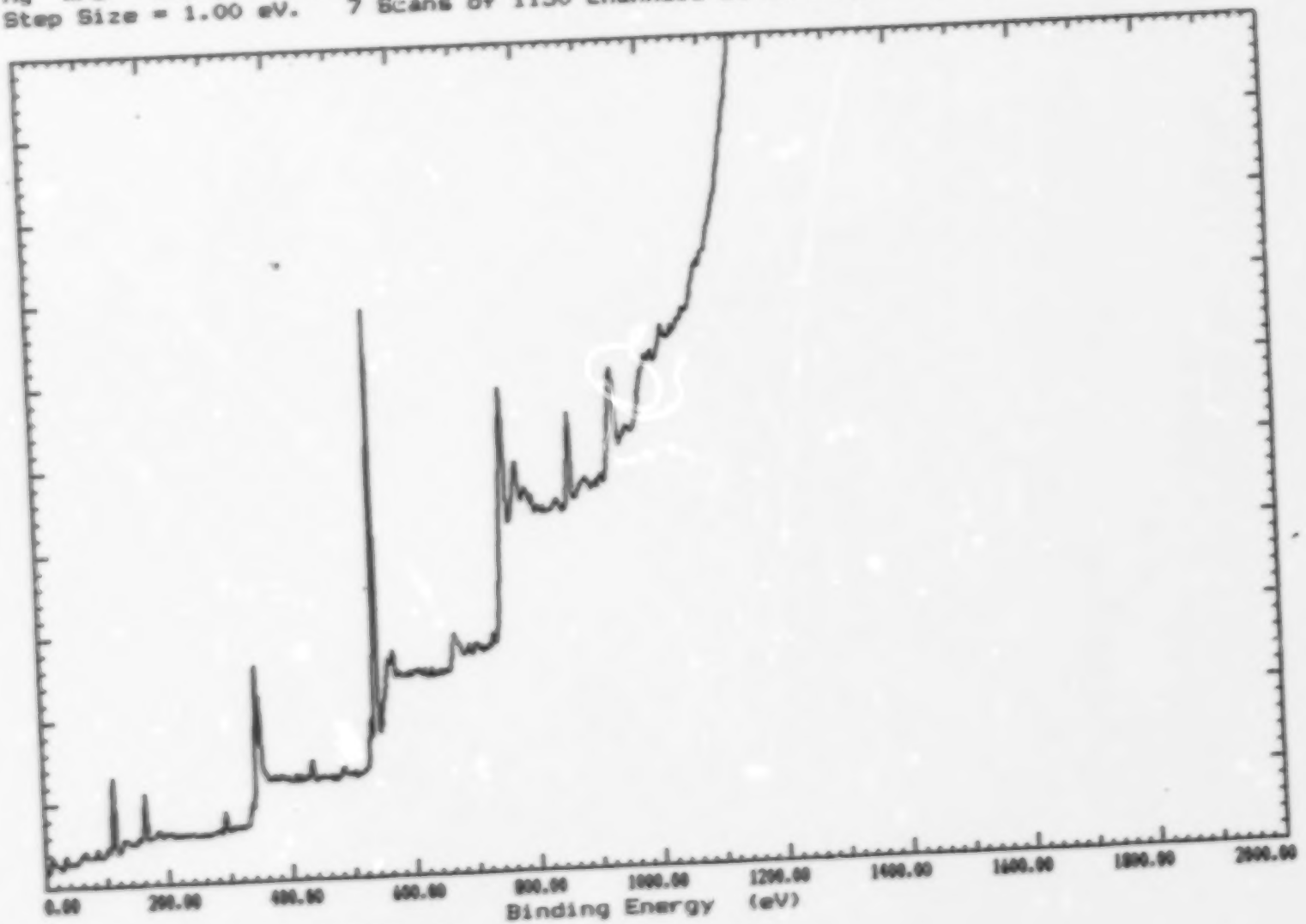
Sample No. 151B (2.98% Pd)

CALCINED

Reproducibility test

ASA29 Region 1 SURVEY

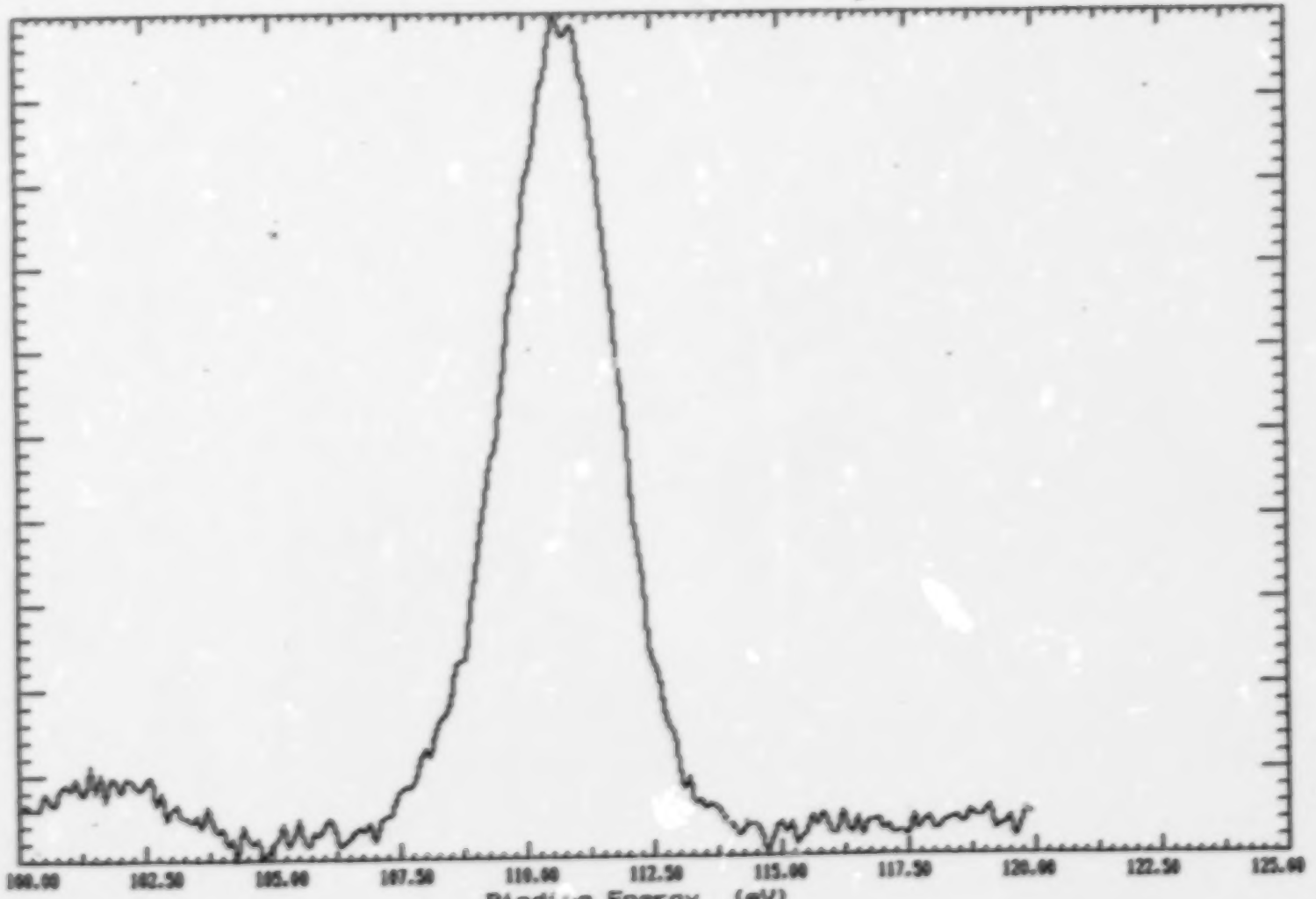
Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 87168
Step Size = 1.00 eV. 7 Scans of 1150 channels at 50 ms per chan



GL-4-151B CM 15D/H MG300 NR
OPT SI2P+MECA
17H15 1 DEC 89

ASA29 Region 2 SI2P VG SCIENTIFIC

Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 1848
Step Size = 0.10 eV. 40 Scans of 200 channels at 50 ms per chan

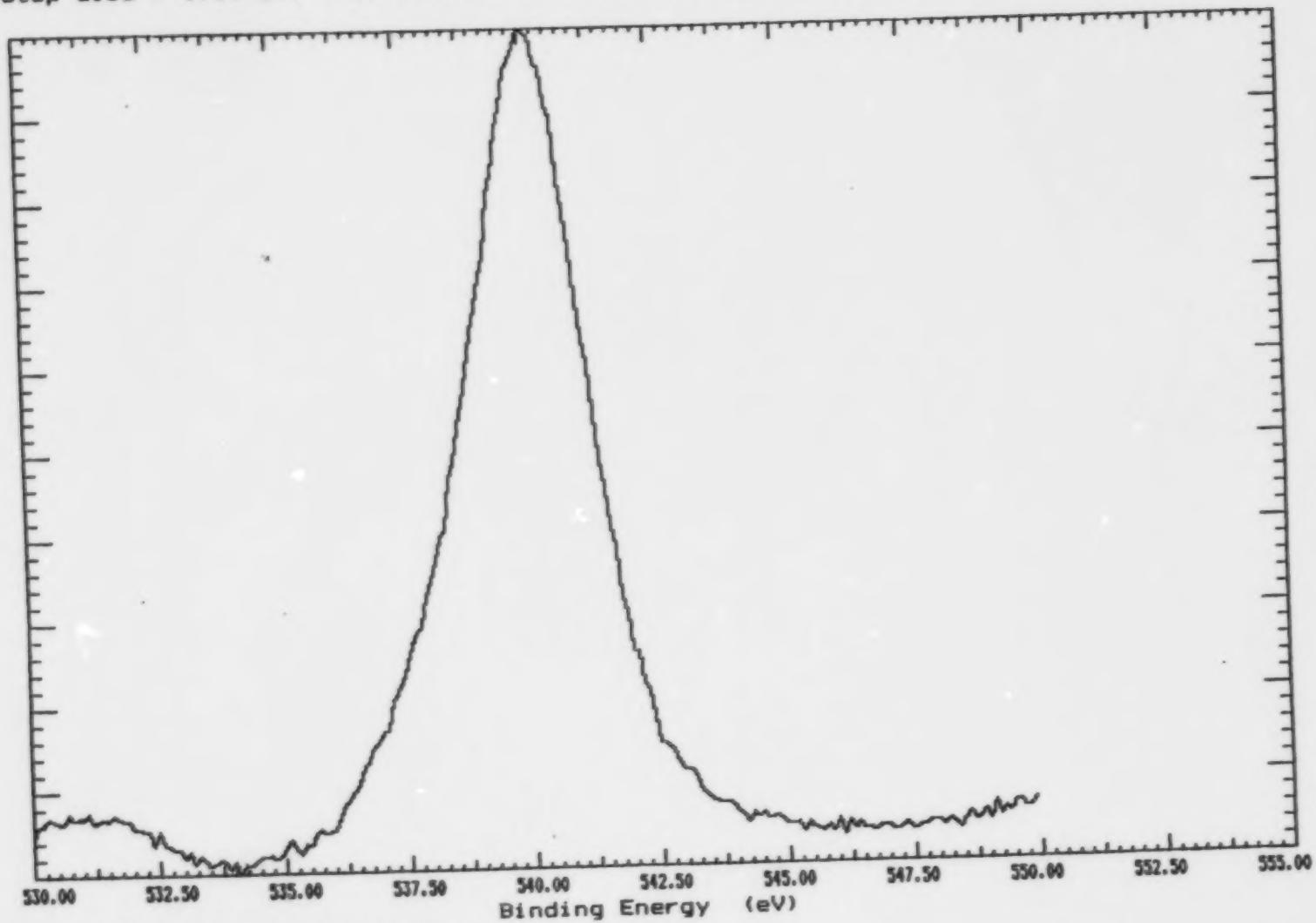


GL-4-151B CM 15D/H MG300 NR
OPT SI2P+MECA
17H15 1 DEC 89

ASA29 Region 3 01S

VG SCIENTIFIC

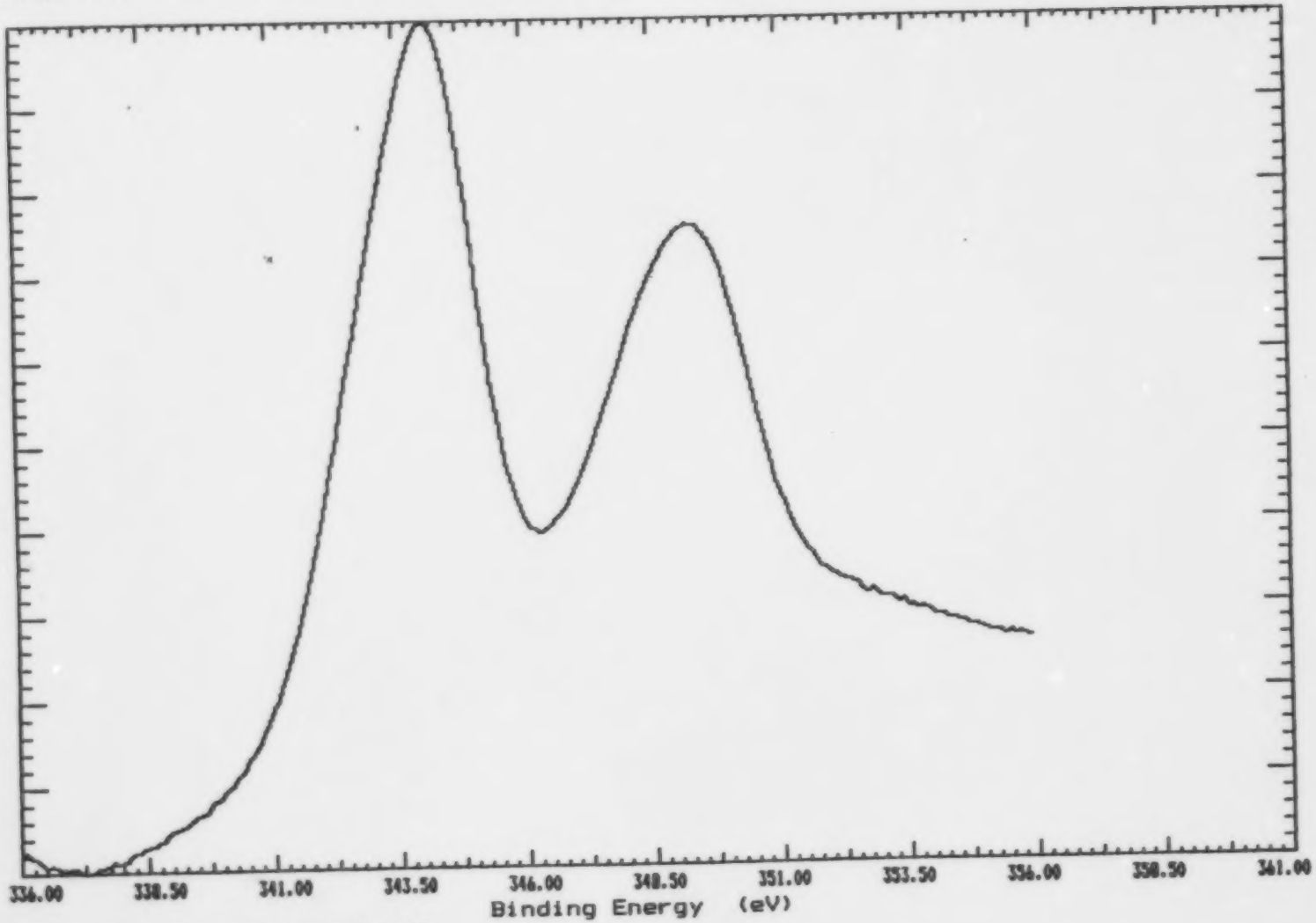
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 11247
Step Size = 0.10 eV. 20 Scans of 200 channels at 50 ms per chan



GL-4-151B CM 15D/H MG300 NR
OPT SI2P+MECA
17H15 1 DEC 89

ASA29 Region 4 PD3D VG SCIENTIFIC

Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 3391
Step Size = 0.10 eV. 1000 Scans of 200 channels at 50 ms per chan

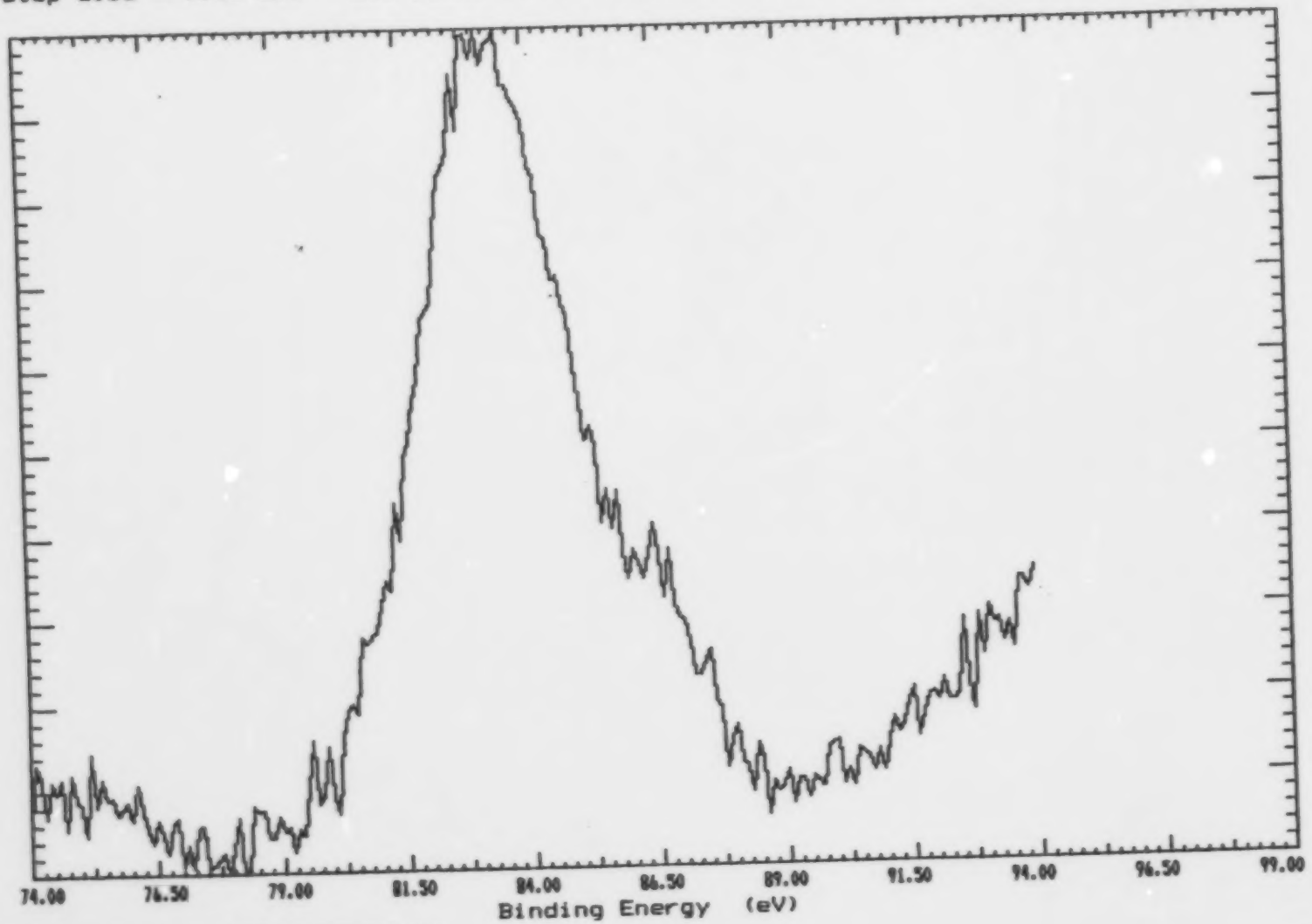


GL-4-151B CM 15D/H MG300 NR
OPT SI2P+MECA
17H15 1 DEC 89

ASA29 Region 5 ALCS

VG SCIENTIFIC

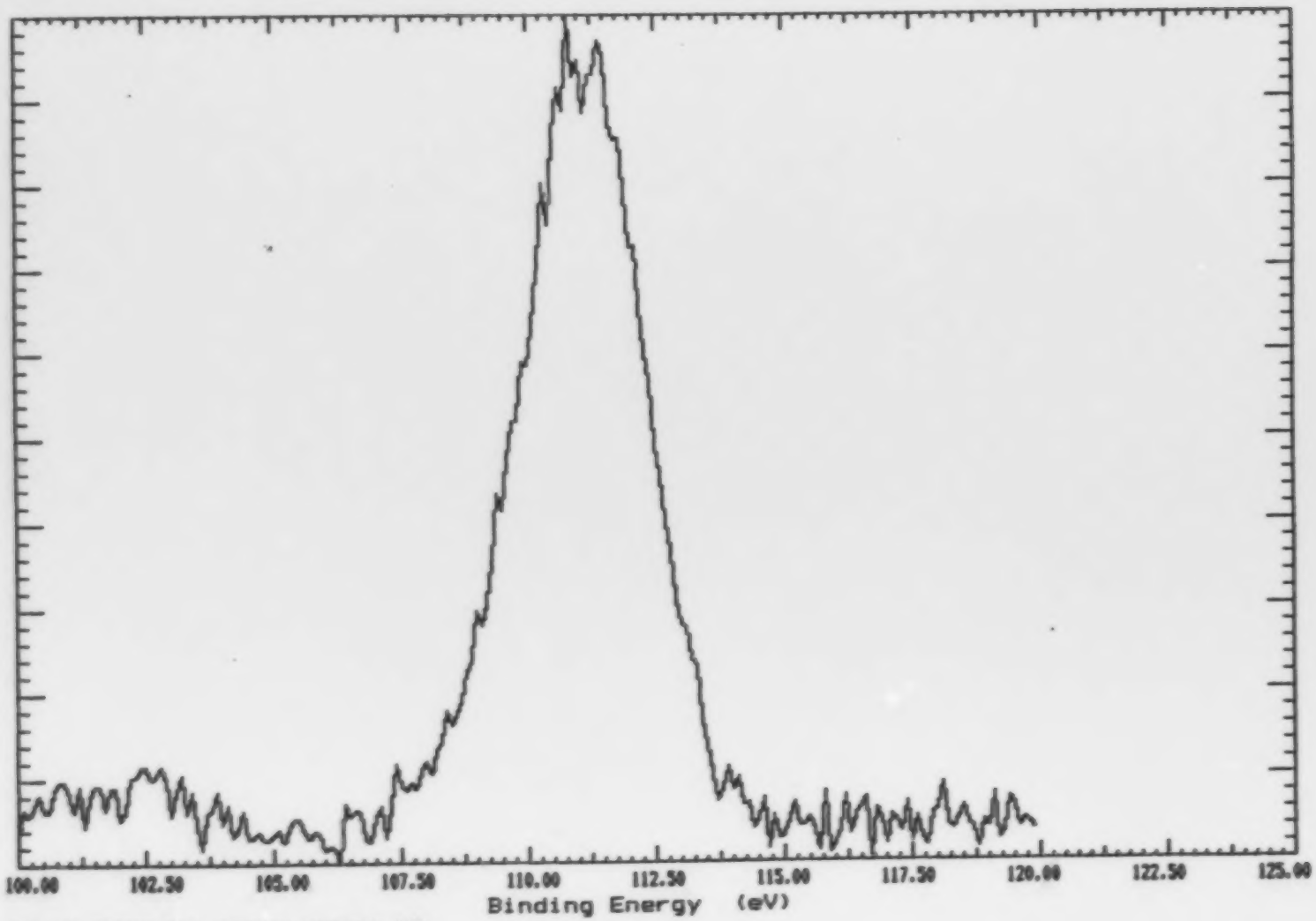
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 212
Step Size = 0.10 eV. 500 Scans of 200 channels at 50 ms per chan



GL-4-151B CM 15D/H MG300 NR
OPT SI2P+MECA
17H15 1 DEC 89

ASA29 Region 6 SI2P VG SCIENTIFIC

Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 1821
Step Size = 0.10 eV. 15 Scans of 200 channels at 50 ms per chan

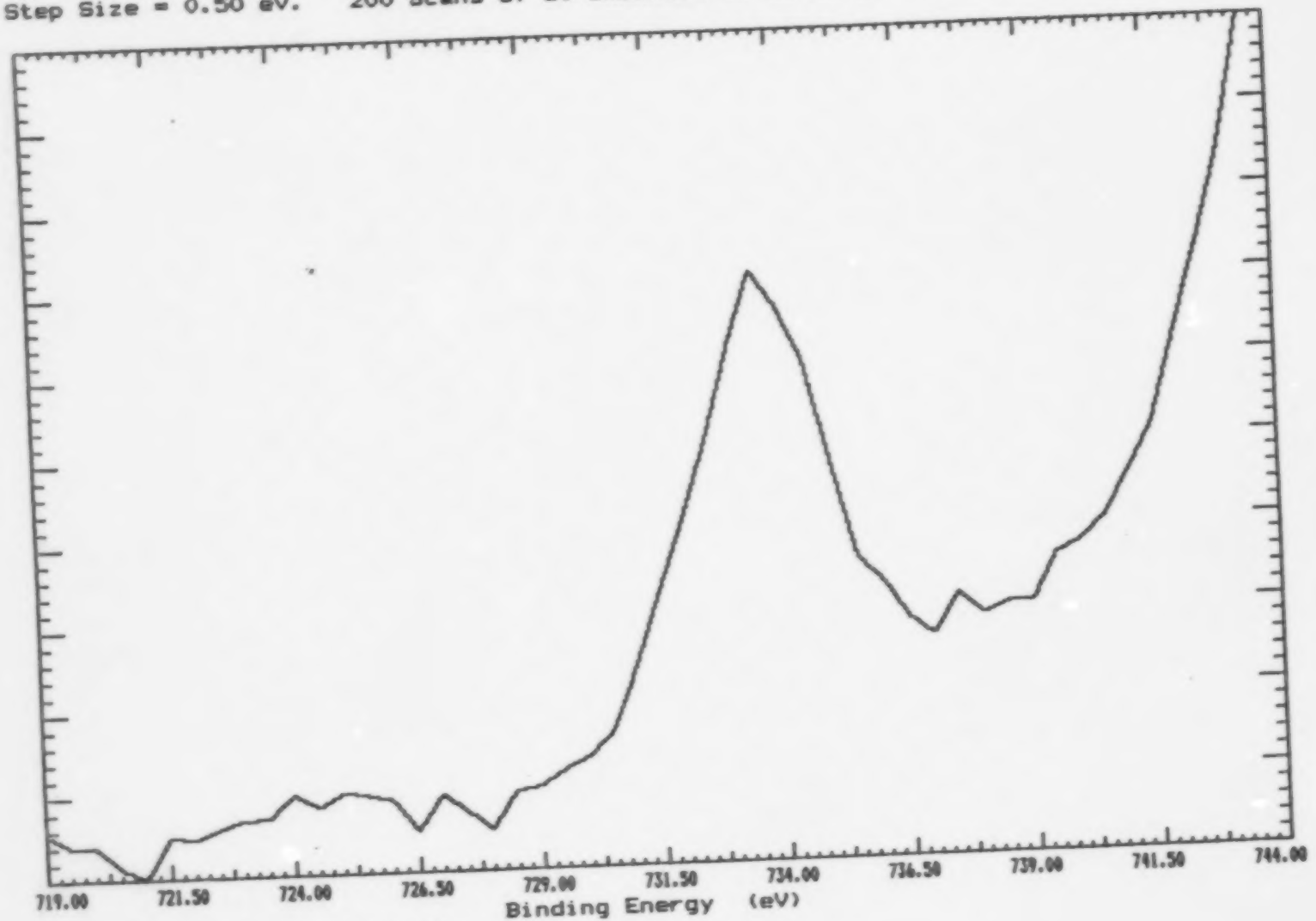


GL-4-151B CM 15D/H MG300 NR
OPT SI2P+MECA
17H15 1 DEC 89

ASA29 Region 7 CS3D

VG SCIENTIFIC

Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 3281
Step Size = 0.50 eV. 200 Scans of 50 channels at 50 ms per chan



GL-4-151B CM 15D/H MG300 NR
OPT SI2P+MECA
17H15 1 DEC 89

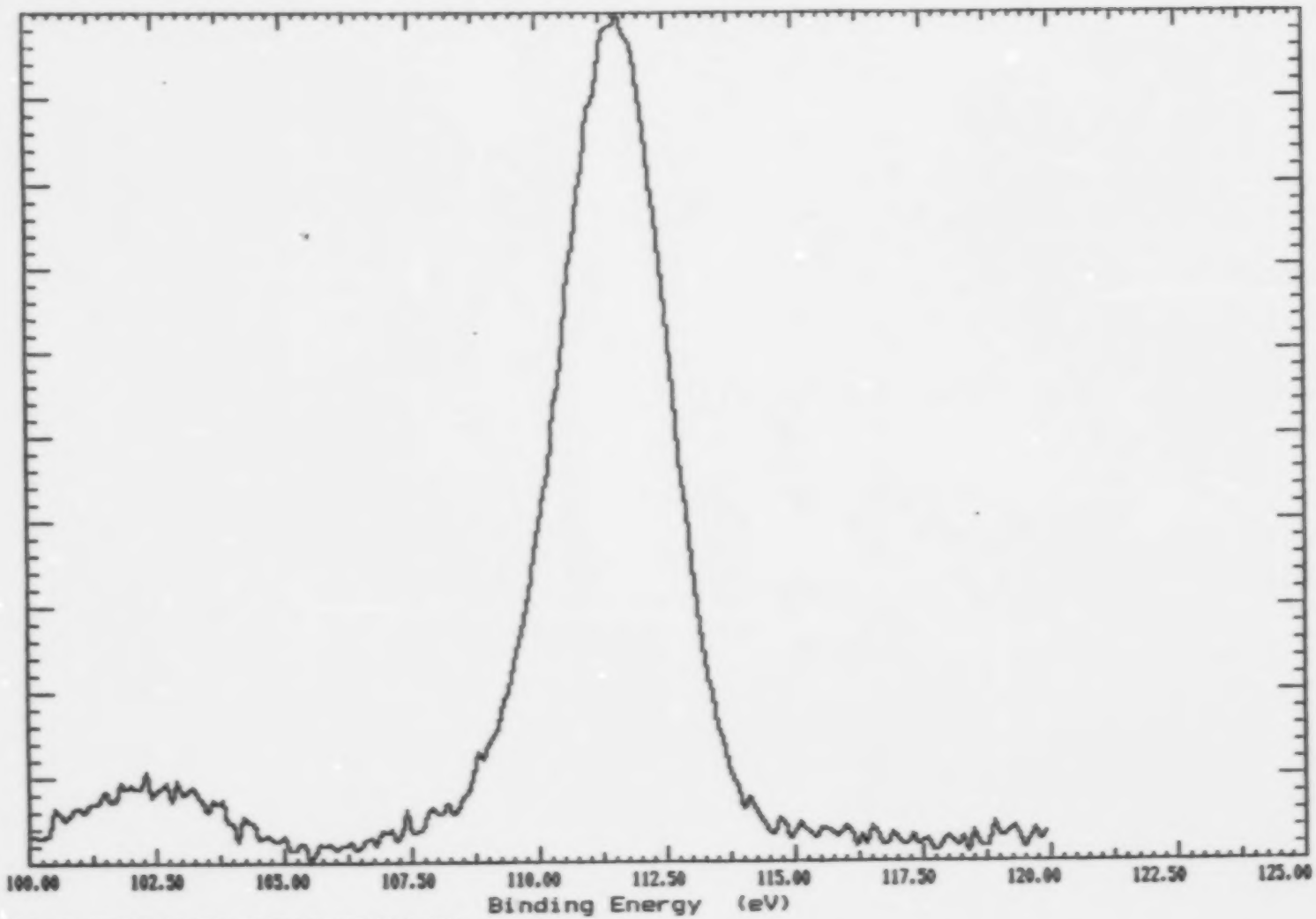
Pd/HZSM-5(B)

Sample No. 151B (2.98% Pd)

REDUCED

ASA17 Region 1 SI2P VG SCIENTIFIC

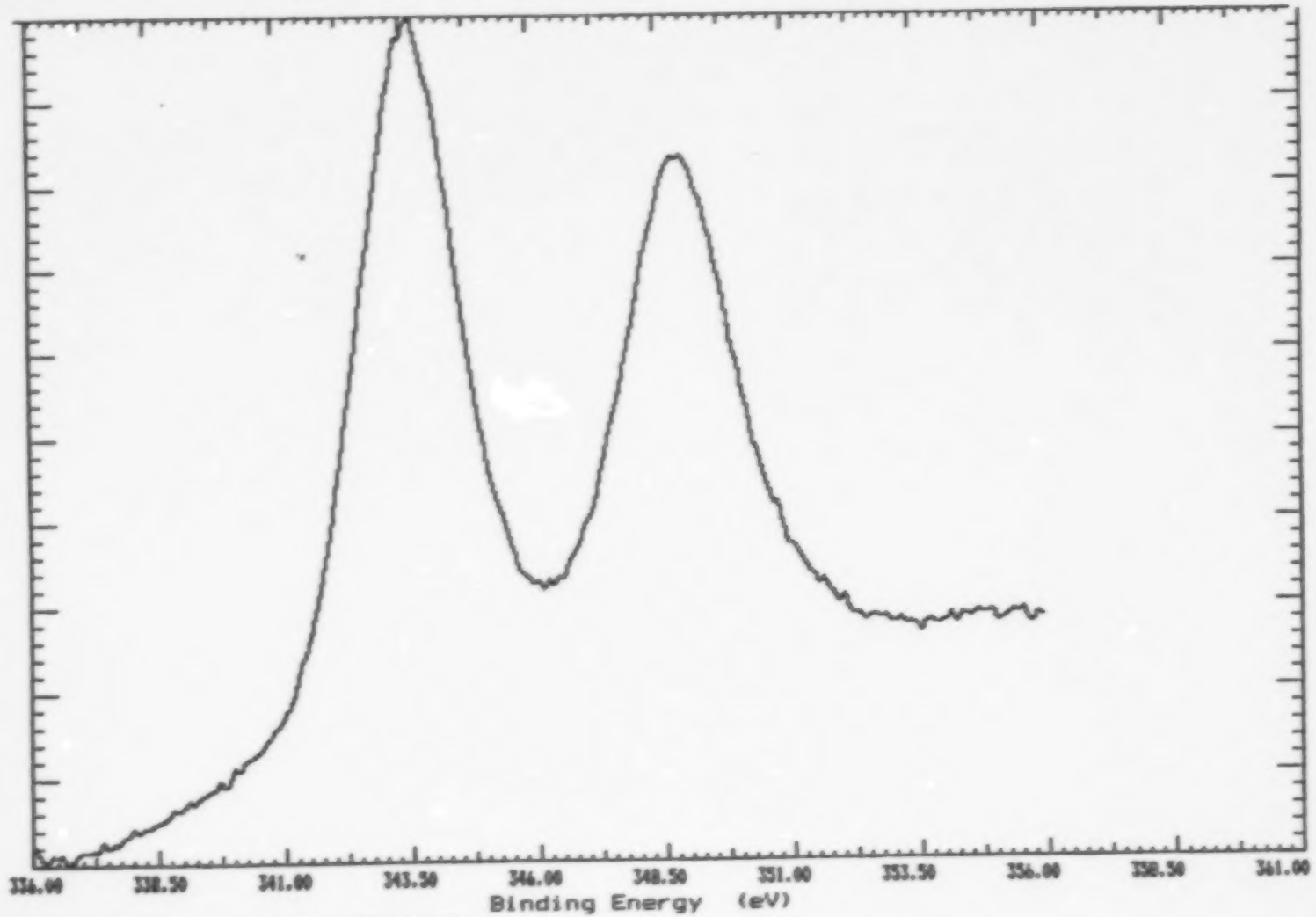
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 2958
Step Size = 0.10 eV. 30 Scans of 200 channels at 50 ms per chan



GL-4-151B-R CM 15D/H MG300 NR
OPT SI2P
1H55 29 NOV 89

ASA17 Region 2 PD3D VG SCIENTIFIC

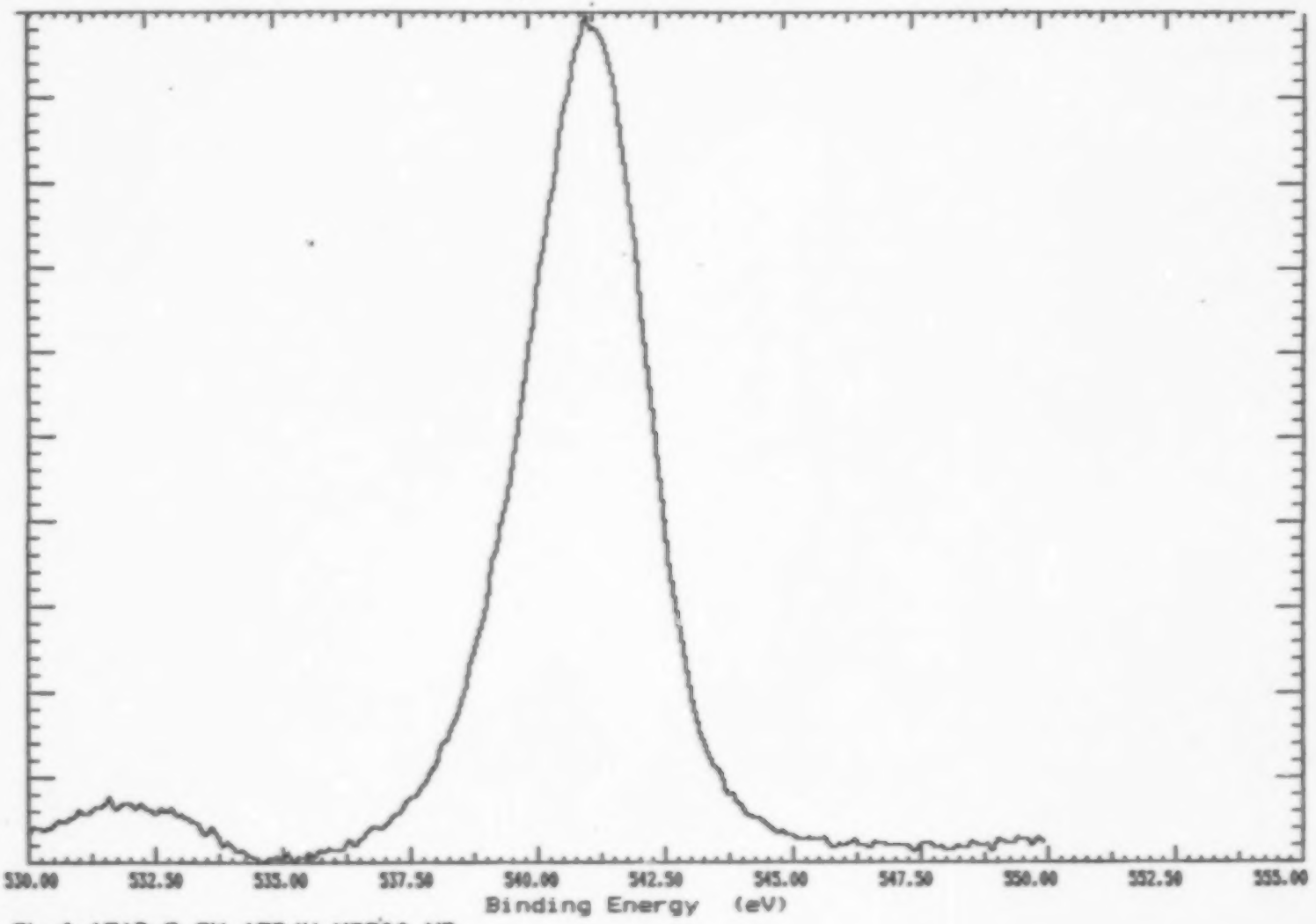
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 3112
Step Size = 0.10 eV. 232 Scans of 200 channels at 50 ms per chan



GL-4-151B-R CM 15D/H MG300 NR
OPT SI2P
1H55 29 NOV 89

ASA17 Region 3 01S VG SCIENTIFIC

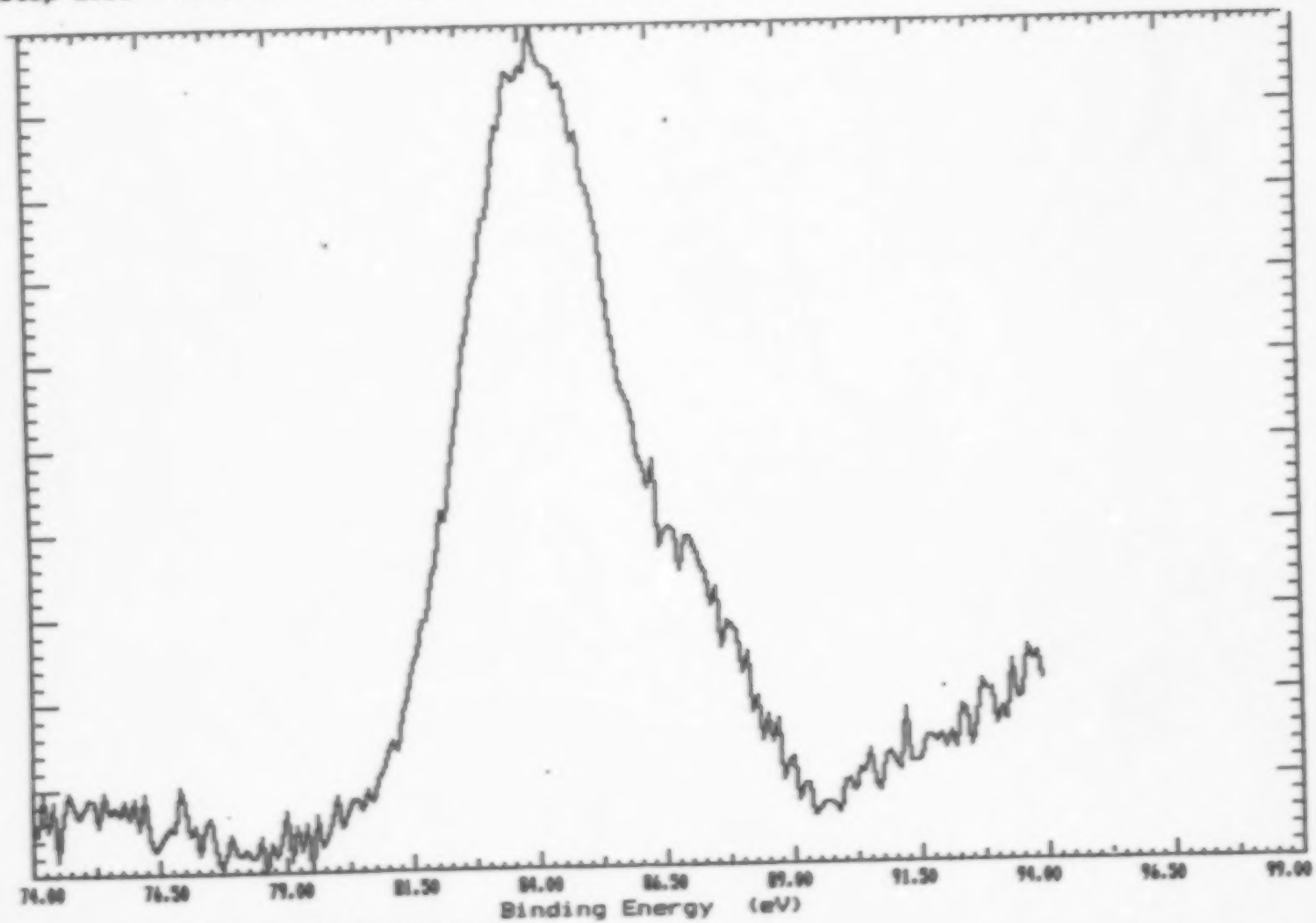
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 17013
Step Size = 0.10 eV. 20 Scans of 200 channels at 50 ms per chan



GL-4-151B-R CM 15D/H MG300 NR
OPT SI2P
1H55 29 NOV 89

ASA17 Region 4 ALCS VG SCIENTIFIC

Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 307
Step Size = 0.10 eV. 378 Scans of 200 channels at 50 ms per chan

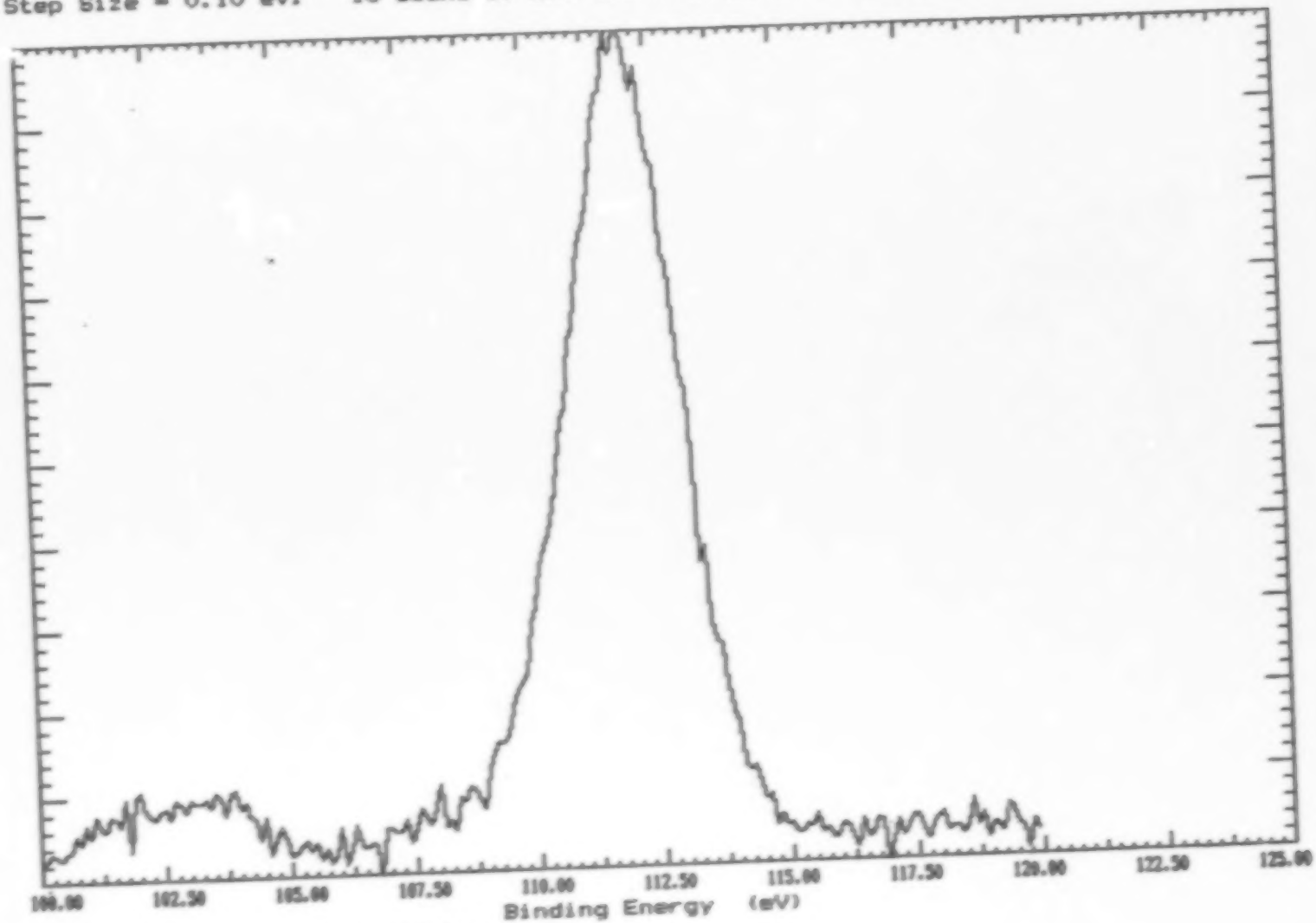


GL-4-151B-R CM 15D/H MG300 NR
DPT S12P
1H55 29 NOV 89

ASA17 Region 5 SI2P

VG SCIENTIFIC

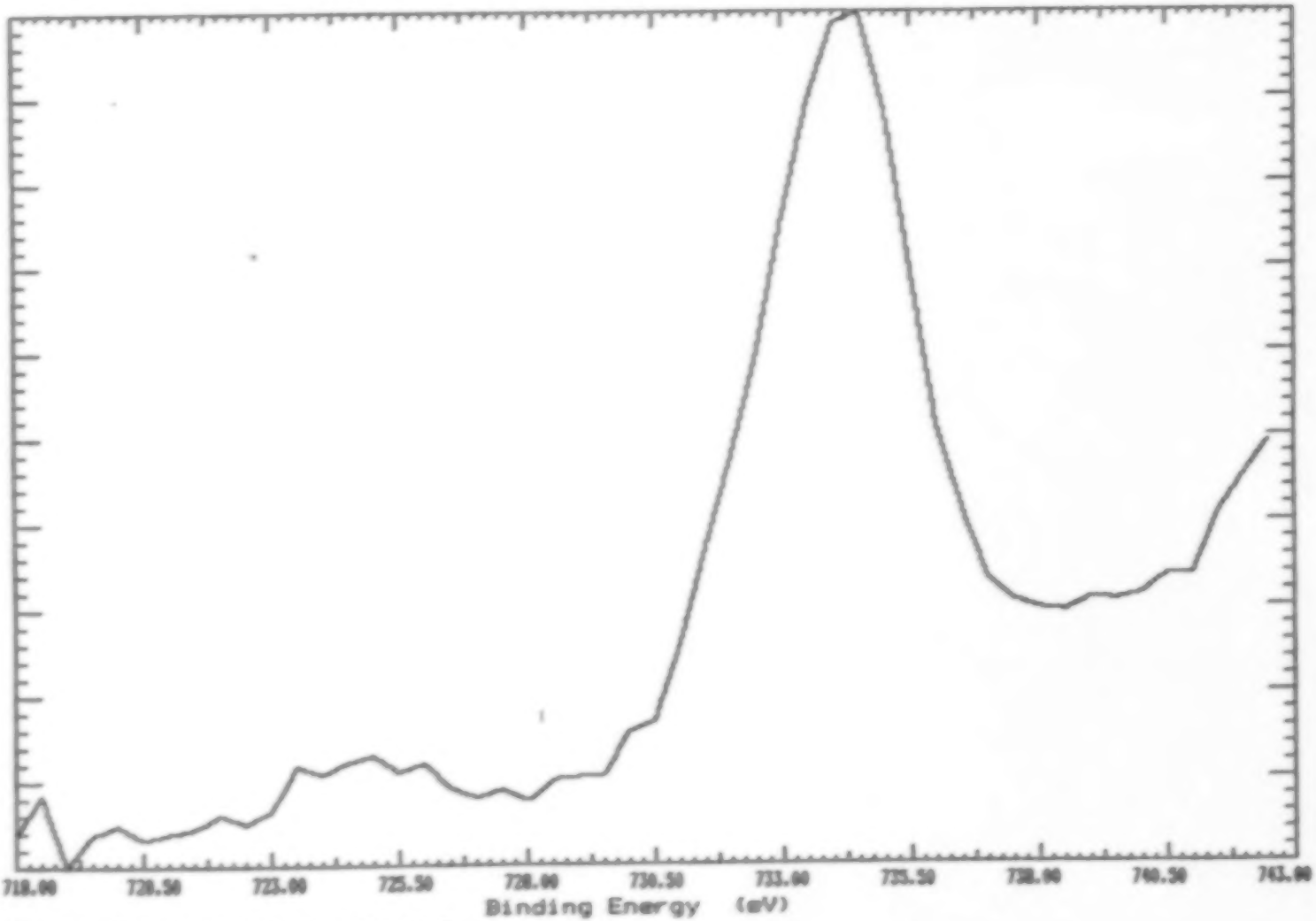
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 2927
Step Size = 0.10 eV. 13 Scans of 200 channels at 50 ms per chan



GL-4-151B-R CM 15D/H MG300 NR
OPT SI2P
1H55 29 NOV 99

ASA17 Region 6 CS3D VG SCIENTIFIC

Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 3707
Step Size = 0.50 eV. 134 Scans of 50 channels at 50 ms per chan



BL-4-151B-R CM 15D/H MG300 NR
OPT SI2P
1H55 29 NOV 89

Pd/HZSM-5(B)

Sample No. 151B (2.98% Pd)

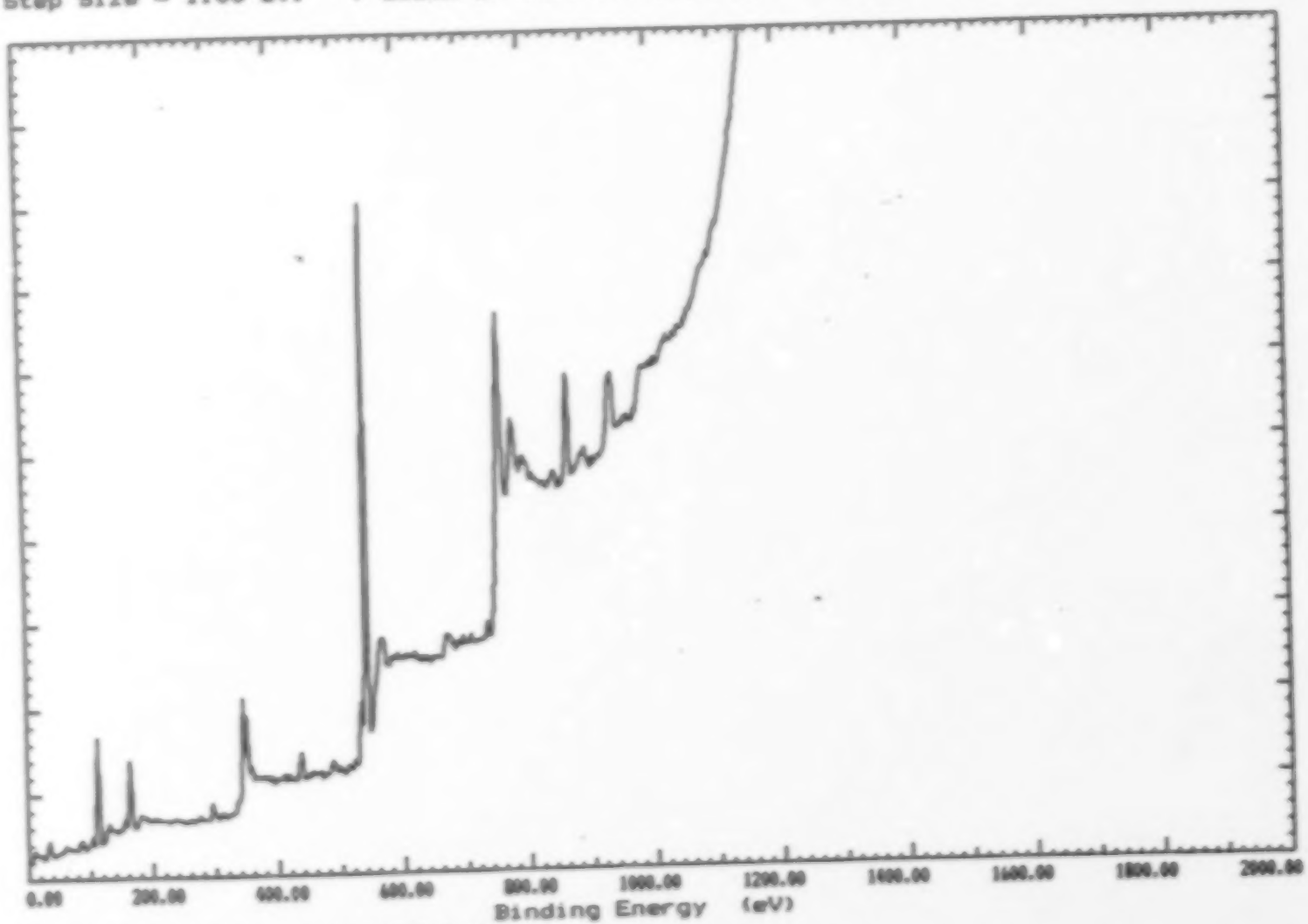
REDUCED

Reproducibility test

ASA26 Region 1 SURVEY

VG SCIENTIFIC

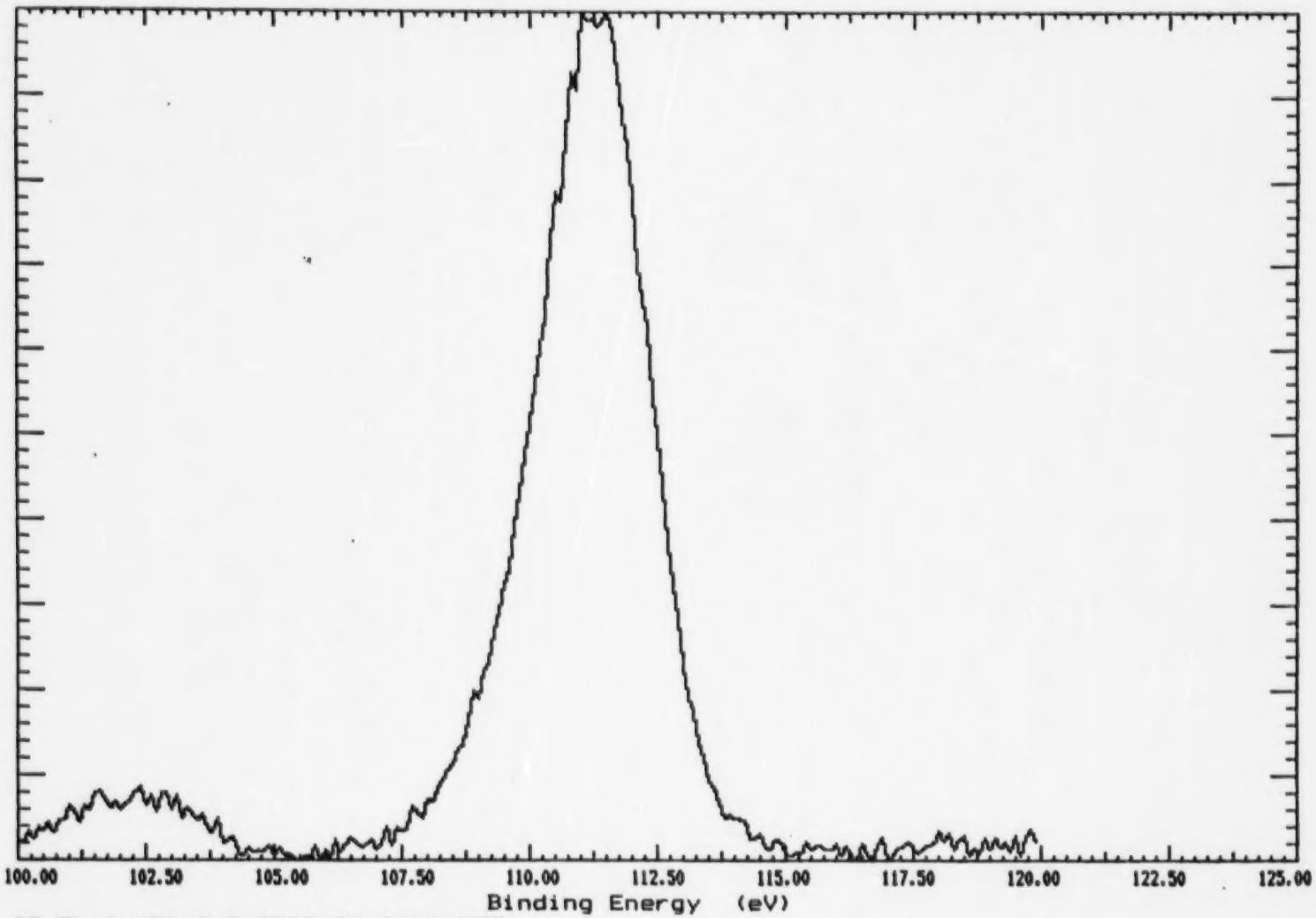
Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 89314
Step Size = 1.00 eV. 7 Scans of 1150 channels at 50 ms per chan



AS GL-4-151-B-R REPRISE COMPLETE
CM 15D/H MG300 MULTI=3.3KV NR
30 NOV.89 17H17

ASA26 Region 2 SI2P VG SCIENTIFIC

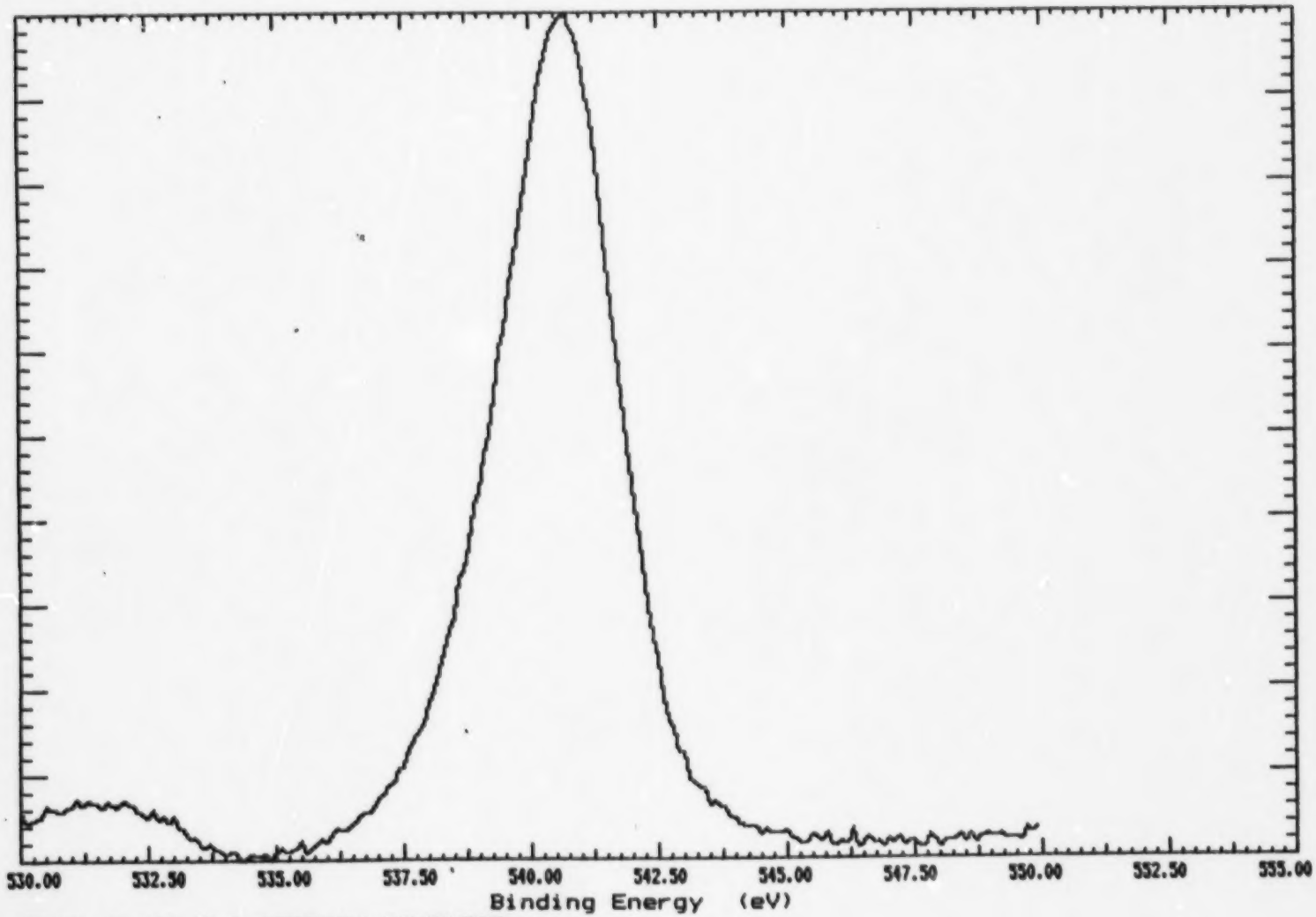
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 2429
Step Size = 0.10 eV. 40 Scans of 200 channels at 50 ms per chan



AS GL-4-151-B-R REPRISE COMPLETE
CM 15D/H MG300 MULTI=3.3KV NR
30 NOV.89 17H17

ASA26 Region 3 01S VG SCIENTIFIC

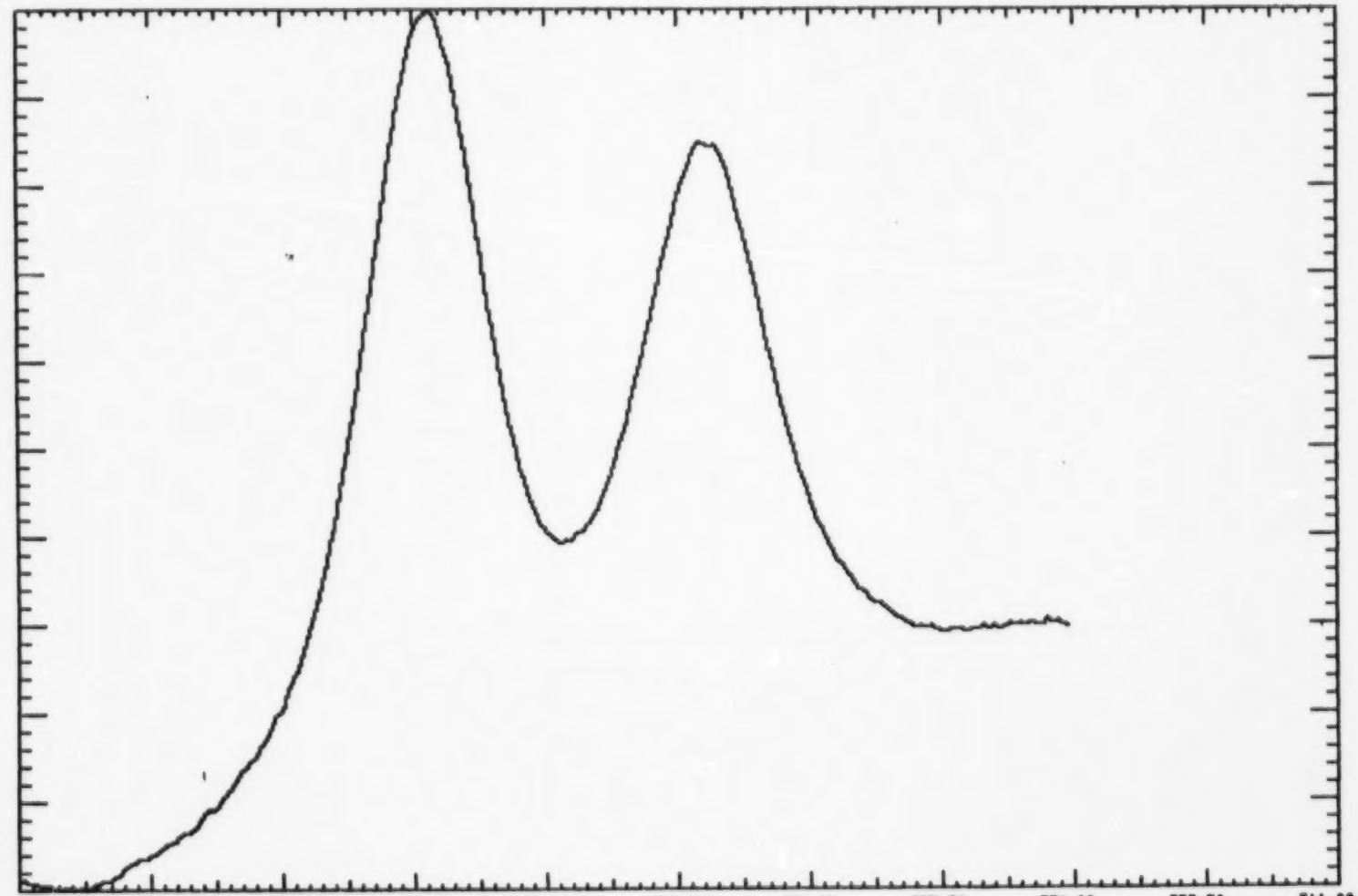
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 14040
Step Size = 0.10 eV. 20 Scans of 200 channels at 50 ms per chan



AS GL-4-151-B-R REPRISE COMPLETE
CM 15D/H MG300 MULTI=3.3KV NR
30 NOV.89 17H17

ASA26 Region 4 PD3D VG SCIENTIFIC

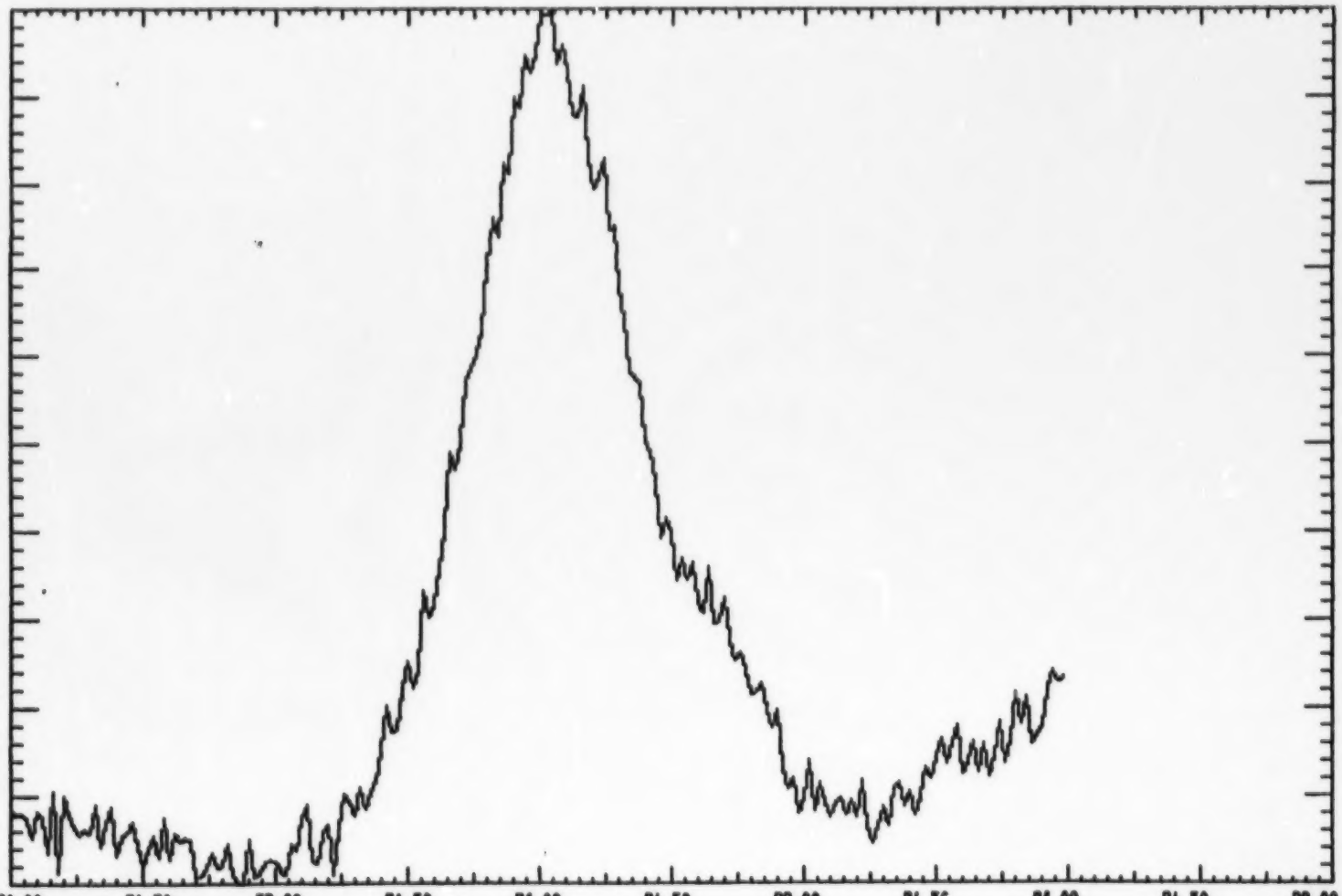
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 2298
Step Size = 0.10 eV. 2000 Scans of 200 channels at 50 ms per chan



AS GL-4-151-B-R REPRISE COMPLETE
CM 15D/H MG300 MULTI=3.3KV NR
30 NOV.89 · 17H17

ASA26 Region 5 ALCS VG SCIENTIFIC

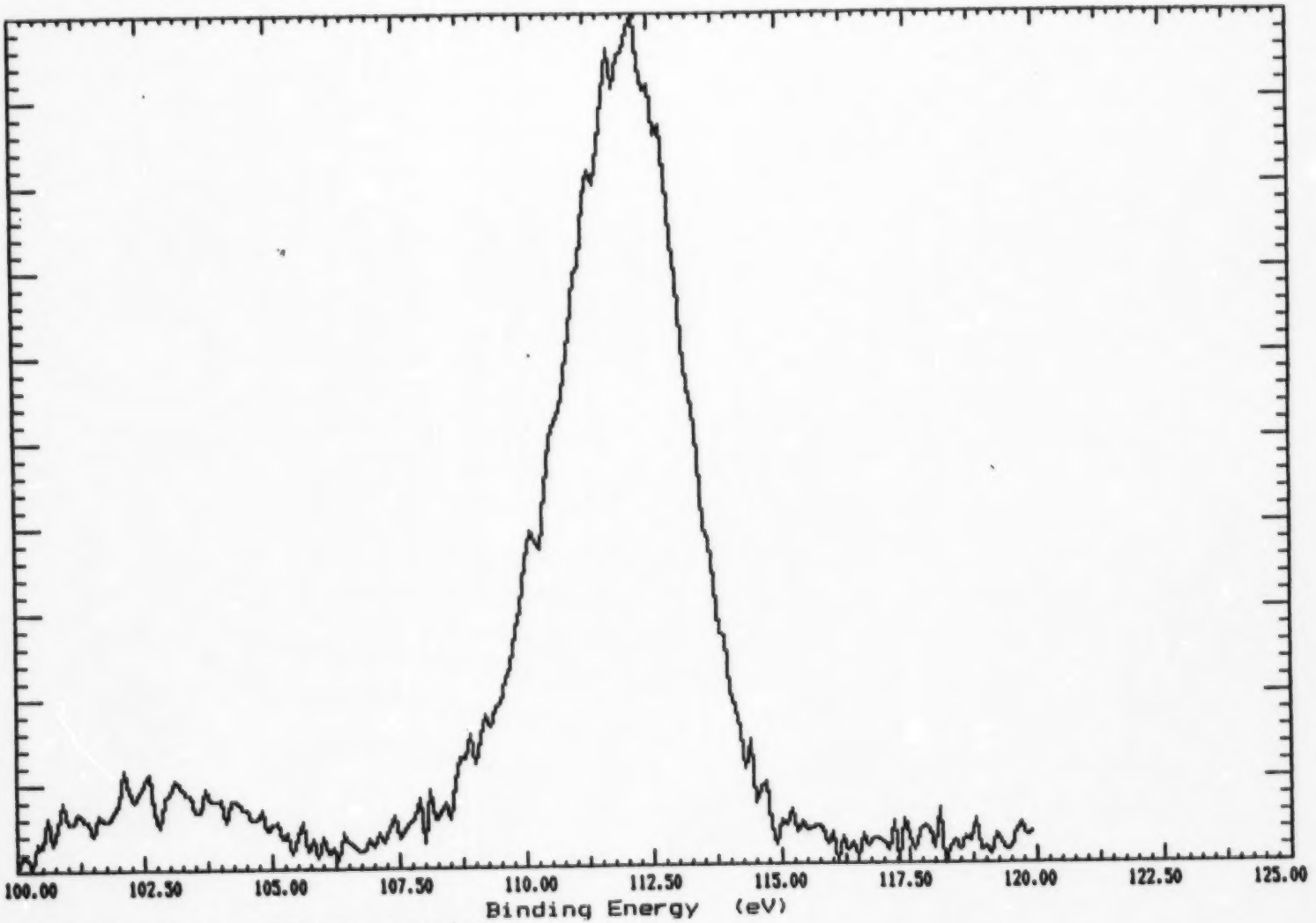
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 242
Step Size = 0.10 eV. 500 Scans of 200 channels at 50 ms per chan



AS GL-4-151-B-R REPRISE COMPLETE
CM 15D/H MG300 MULTI=3.3KV NR
30 NOV.89 17H17

ASA26 Region 6 SI2P VG SCIENTIFIC

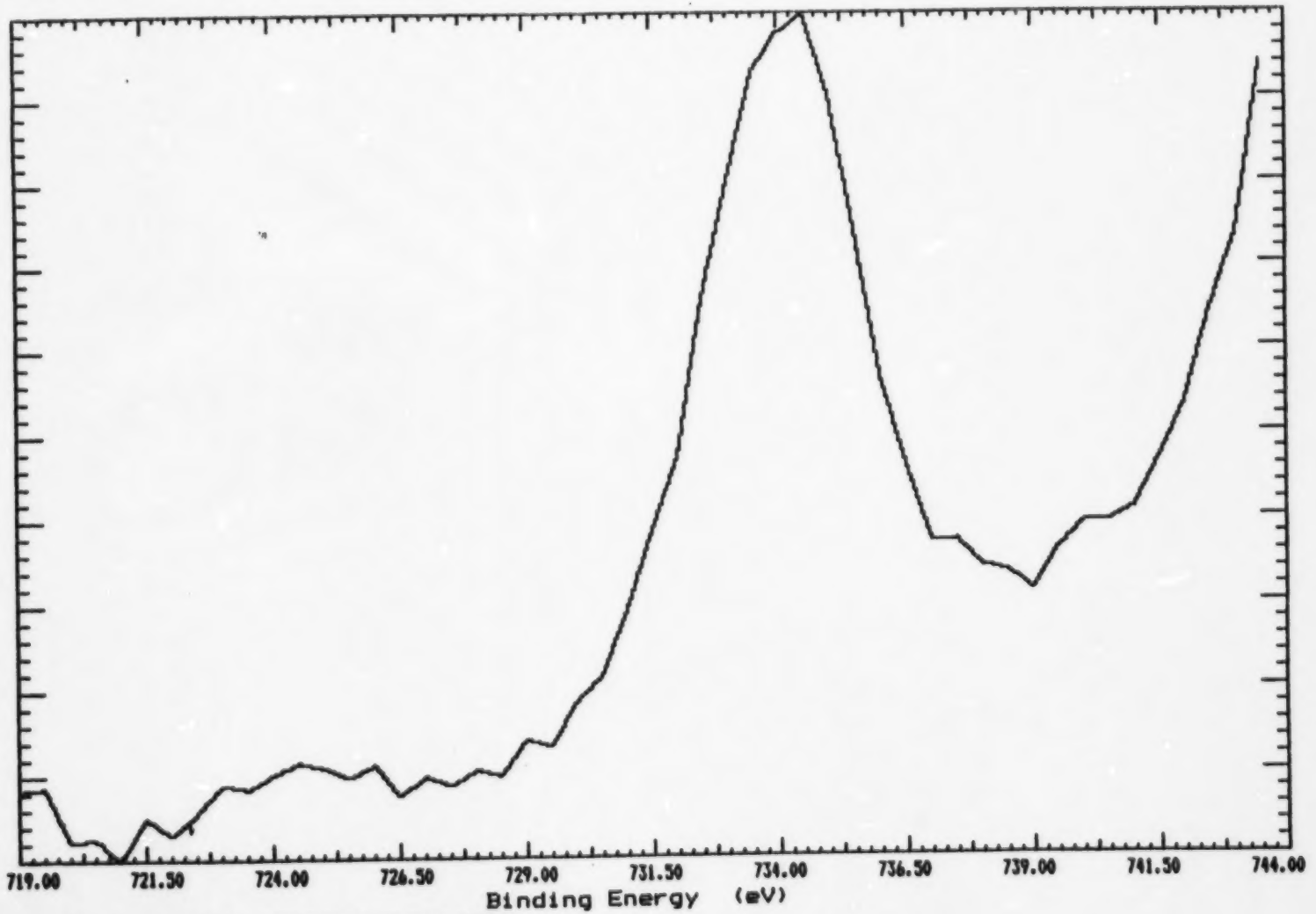
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 2286
Step Size = 0.10 eV. 15 Scans of 200 channels at 50 ms per chan



AS GL-4-151-B-R REPRISE COMPLETE
CM 15D/H MG300 MULTI=3.3KV NR
30 NOV.89 17H17

ASA26 Region 7 CS3D VG SCIENTIFIC

Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 2768
Step Size = 0.50 eV. 200 Scans of 50 channels at 50 ms per chan



AS GL-4-151-B-R REPRISE COMPLETE
CM 15D/H MG300 MULTI=3.3KV NR
30 NOV.89 17H17

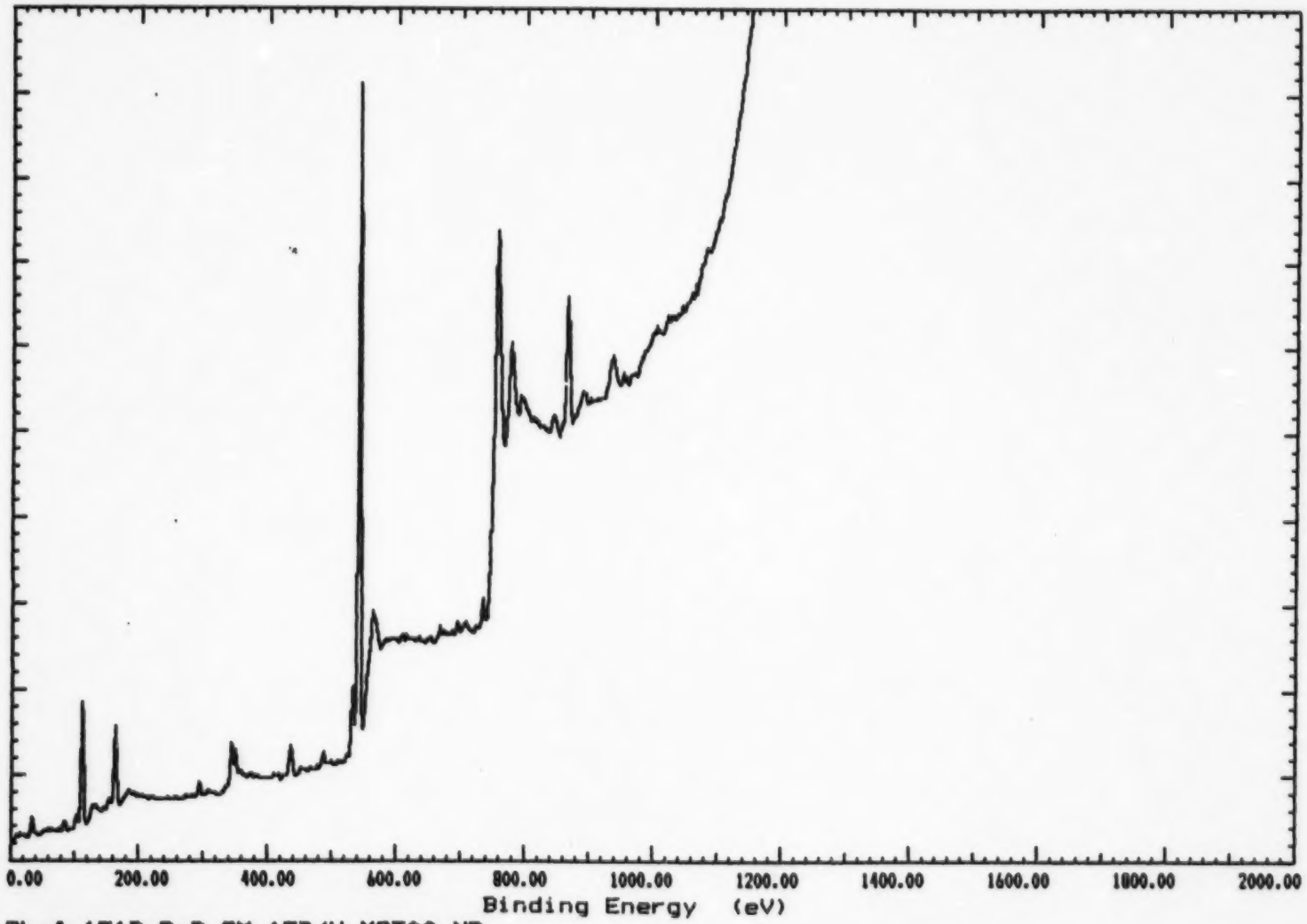
Pd/HZSM-5(B)

Sample No. 151B (2.98% Pd)

REDUCED AND GROUND

ASA25 Region 1 SURVEY VG SCIENTIFIC

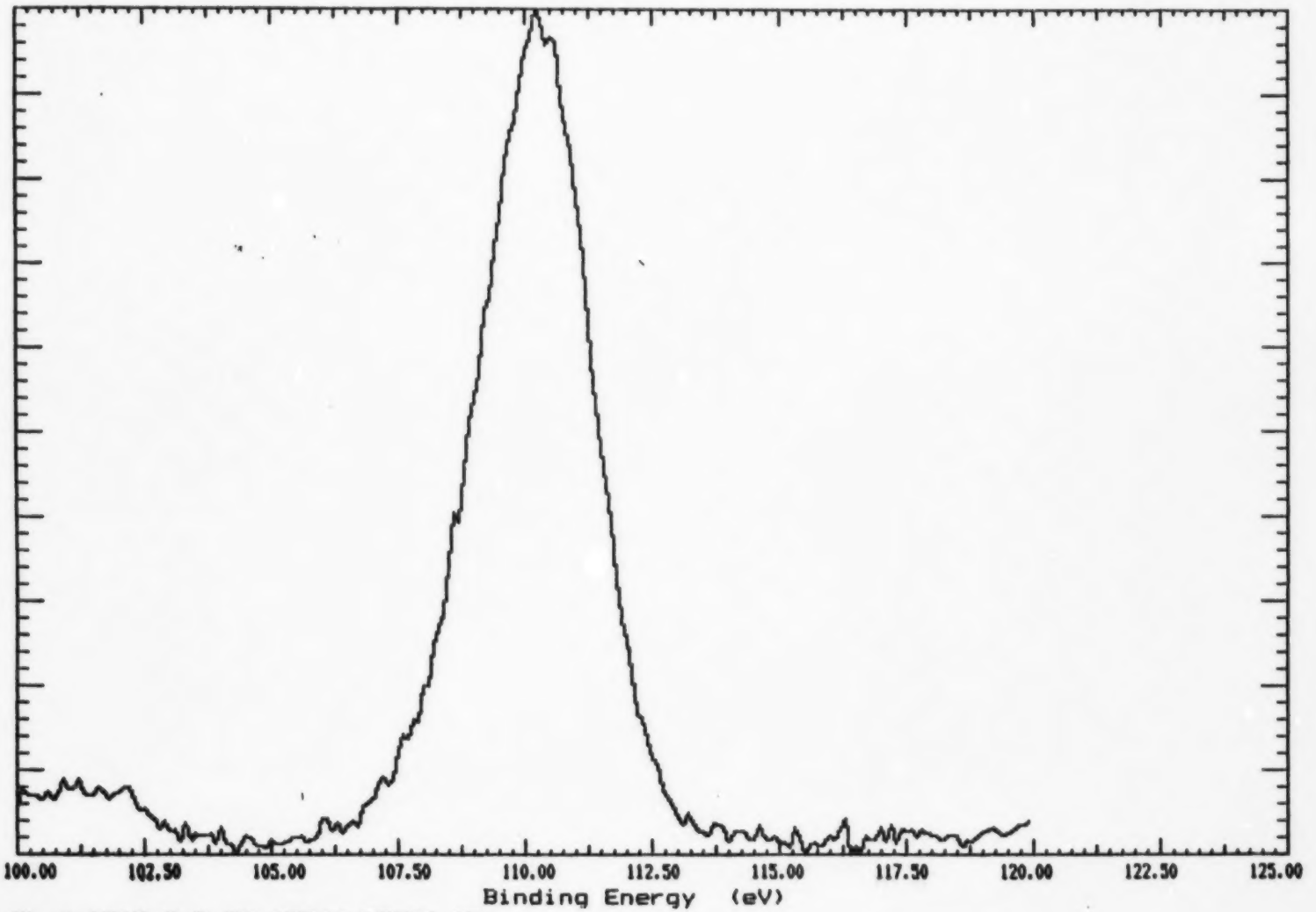
Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 102159
Step Size = 1.00 eV. 7 Scans of 1150 channels at 50 ms per chan



GL-4-151B-R-B CM 15D/H MG300 NR
REPRISE SURVEY DE ASA16 OPT SI2P+MECA
16H20 30 NOV 89

ASA16 Region 1 SI2P VG SCIENTIFIC

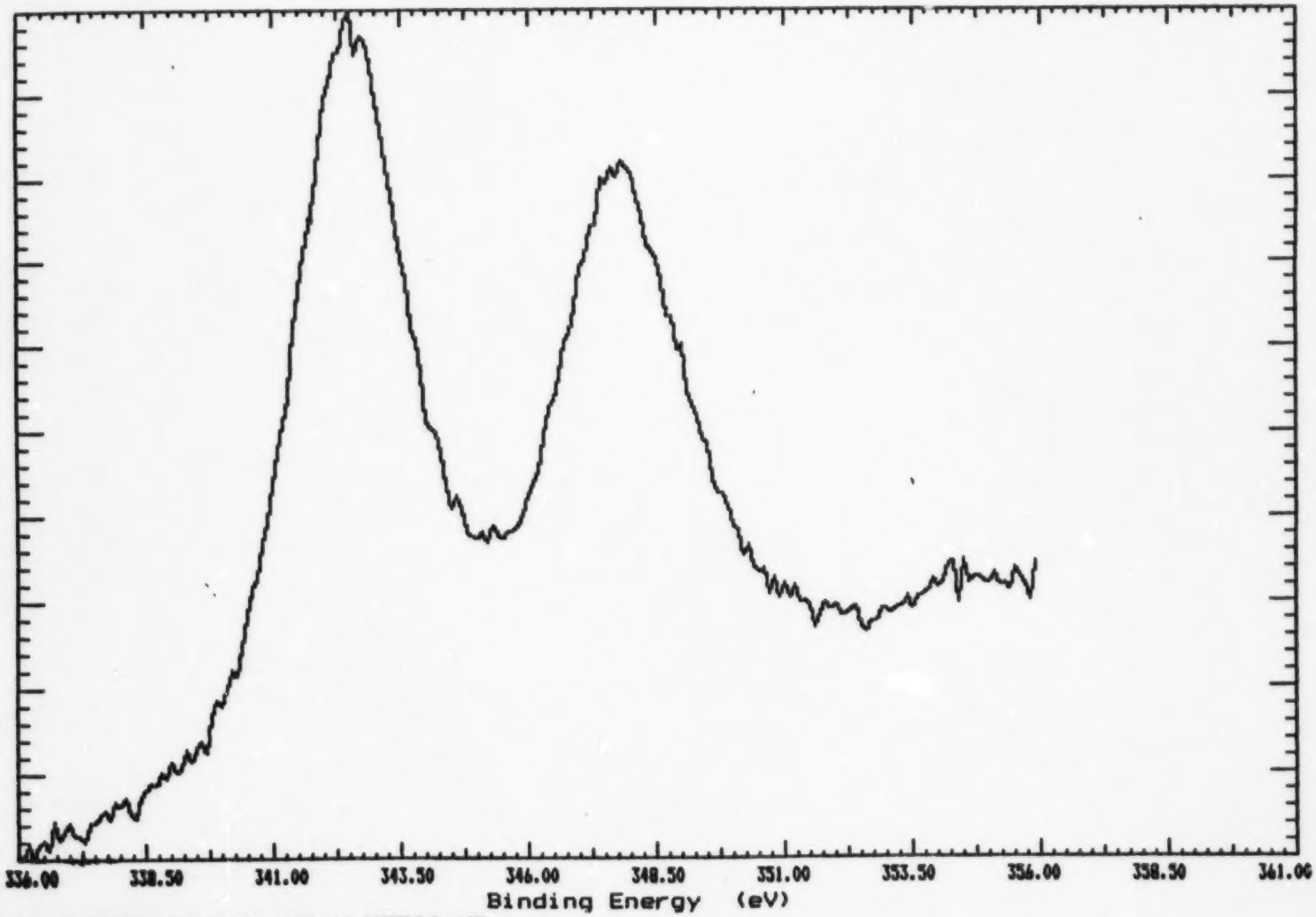
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 3230
Step Size = 0.10 eV. 30 Scans of 200 channels at 50 ms per chan



GL-4-151B-R-B CM 15D/H MG300 NR
OPT SI2P+MECA
10H45 29 NOV 89

ASA16 Region 2 PD3D VG SCIENTIFIC

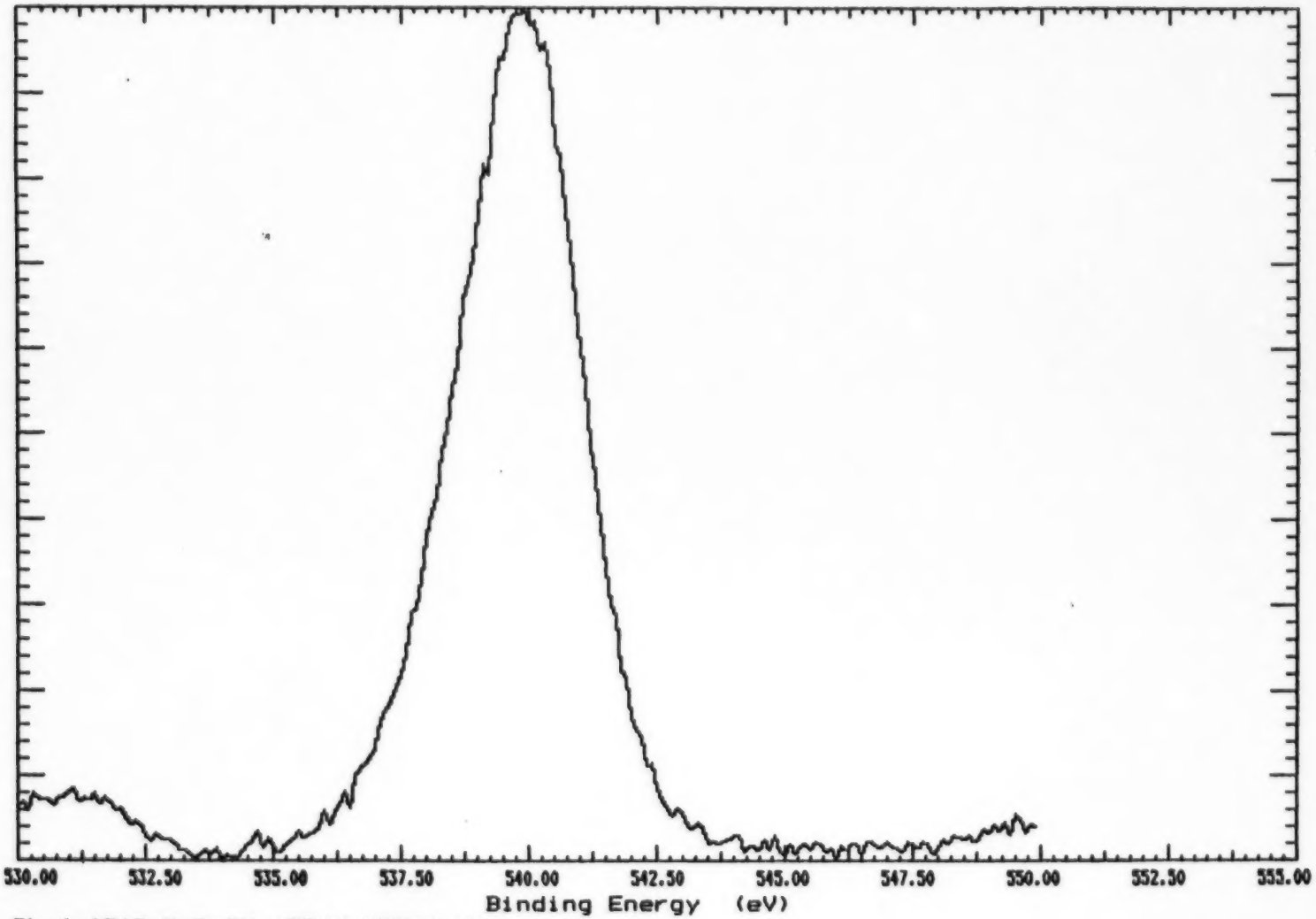
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 1191
Step Size = 0.10 eV. 302 Scans of 200 channels at 50 ms per chan



GL-4-151B-R-B CM 15D/H MG300 NR
OPT SI2P+MECA
10H45 29 NOV 89

ASA16 Region 3 O1S VG SCIENTIFIC

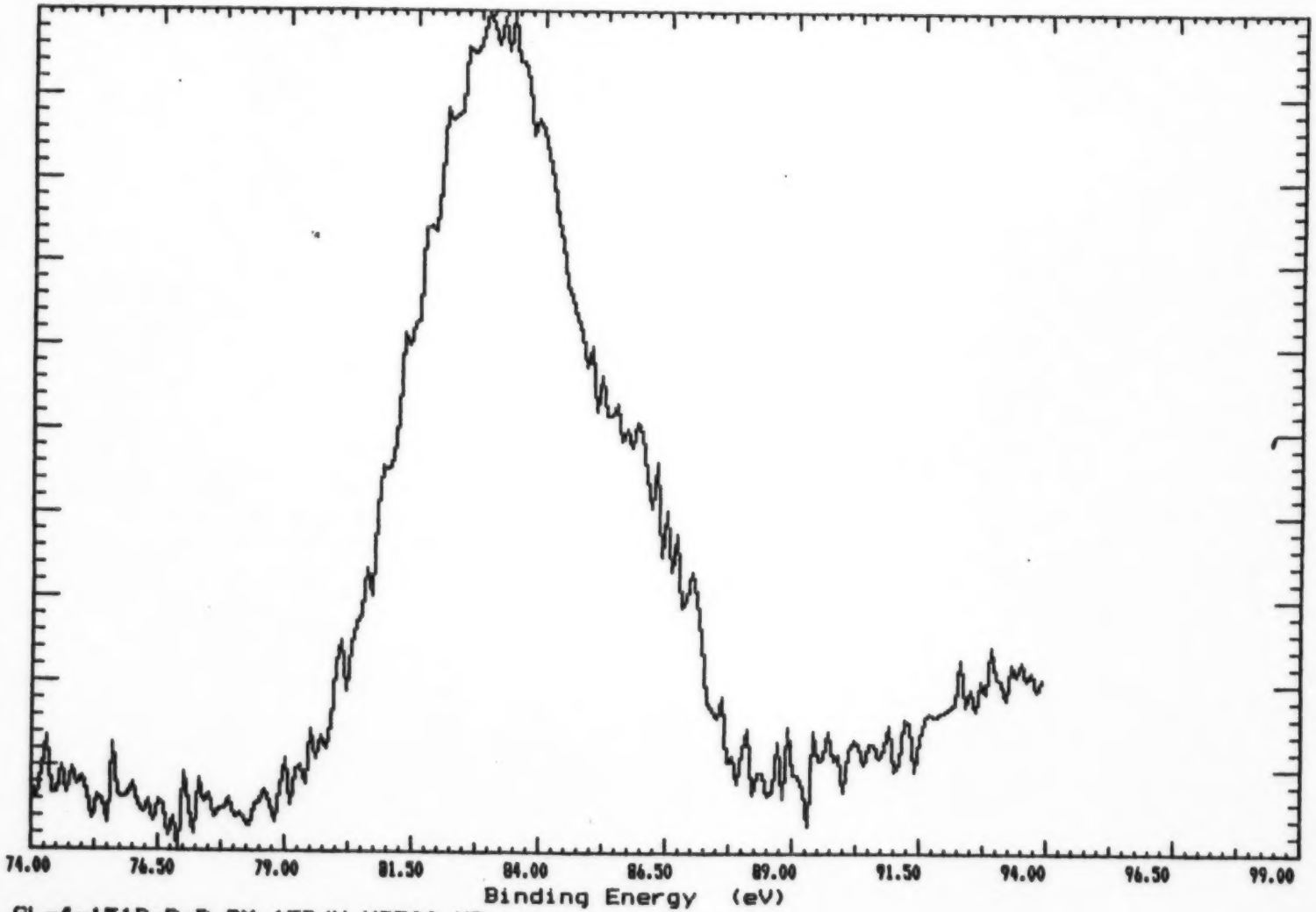
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 18771
Step Size = 0.10 eV. 5 Scans of 200 channels at 50 ms per chan



GL-4-151B-R-B CM 15D/H MG300 NR
OPT SI2P+MECA
10H45 29 NOV 89

ASA16 Region 4 ALCS VG SCIENTIFIC

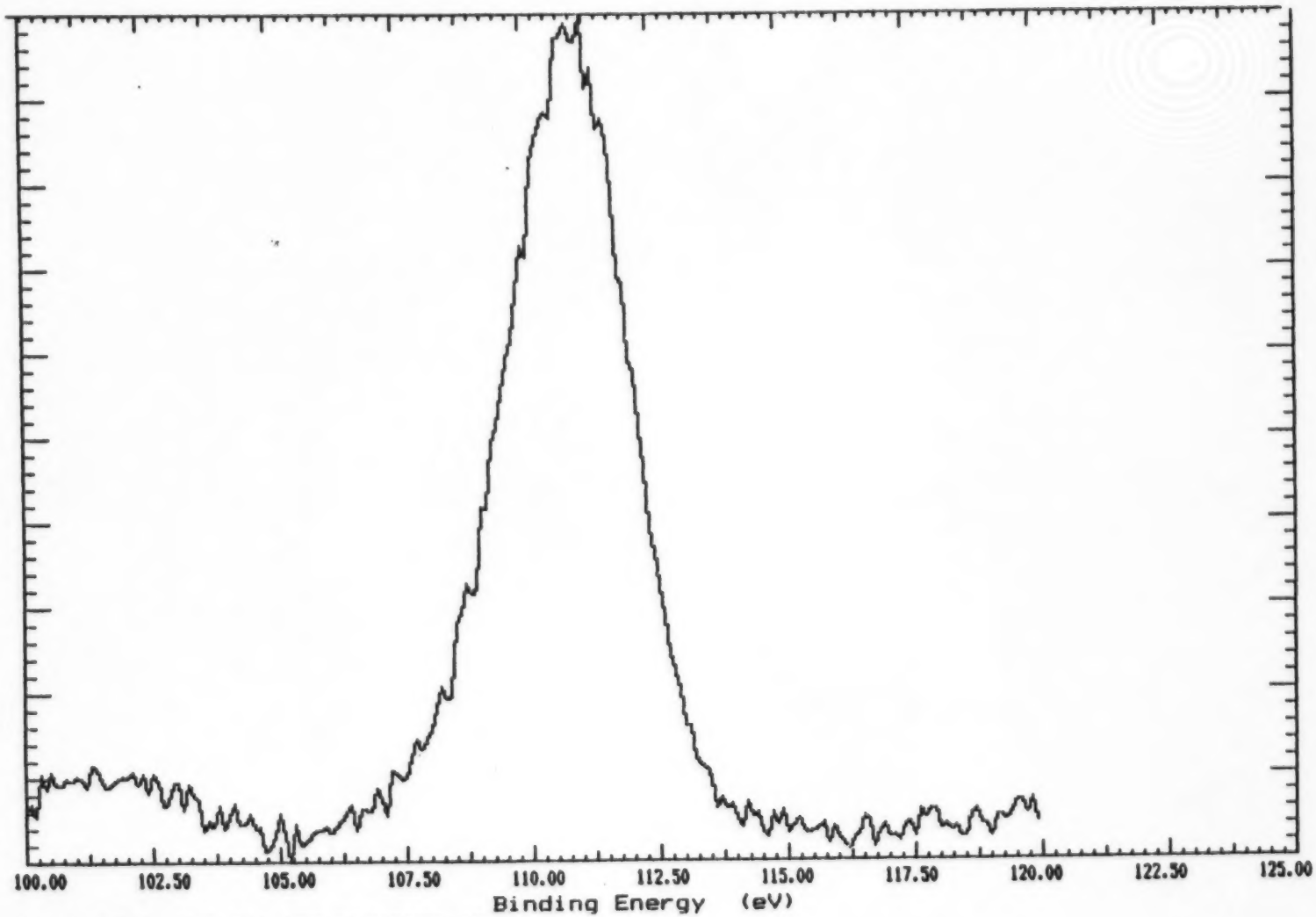
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 283
Step Size = 0.10 eV. 336 Scans of 200 channels at 50 ms per chan



GL-4-151B-R-B CM 15D/H MG300 NR
OPT SI2P+MECA
10H45 29 NOV 89

ASA16 Region 5 SI2P VG SCIENTIFIC

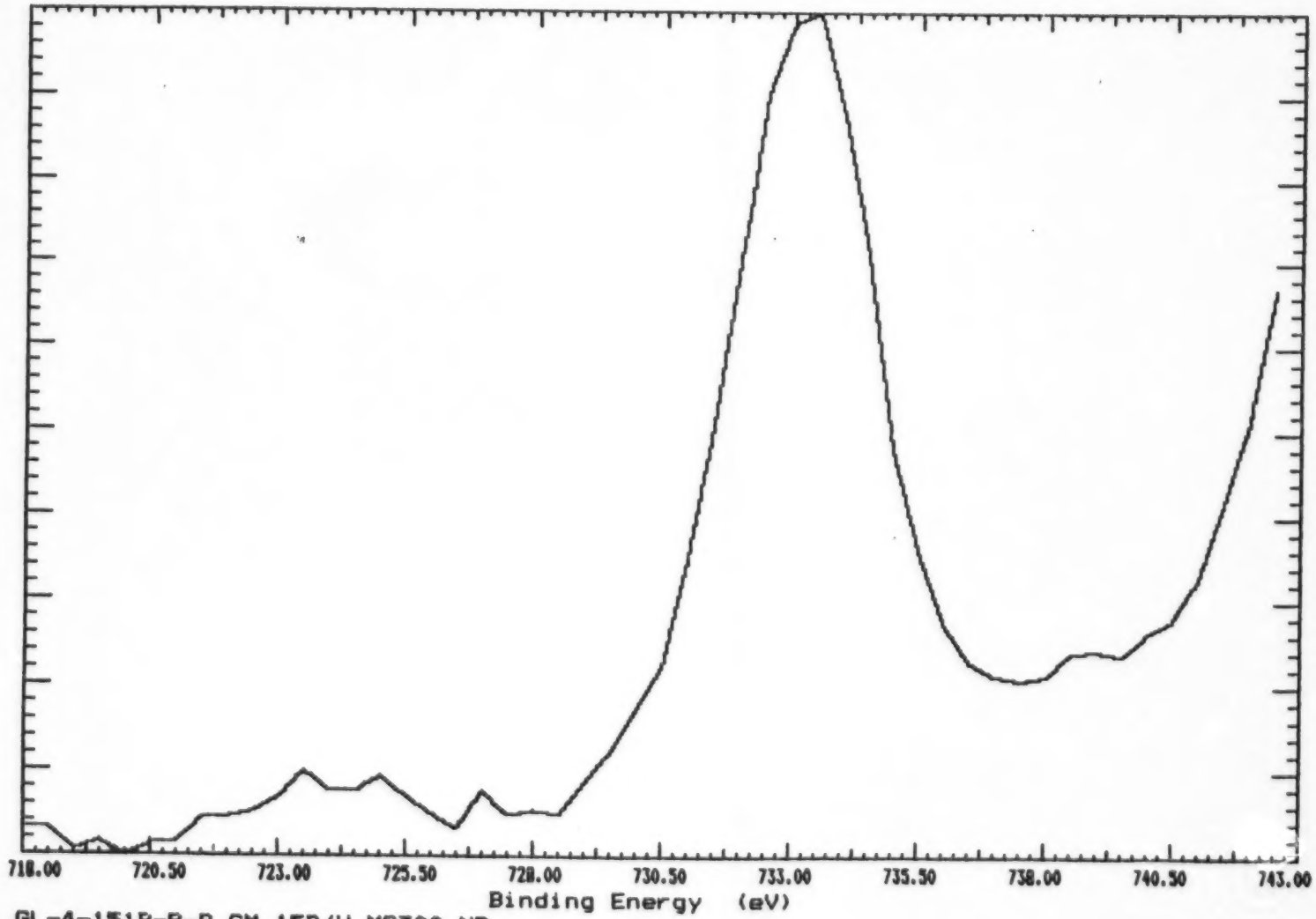
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 3427
Step Size = 0.10 eV. 10 Scans of 200 channels at 50 ms per chan



GL-4-151B-R-B CM 15D/H MG300 NR
OPT SI2P+MECA
10H45 29 NOV 89

ASA16 Region 6 CS3D VG SCIENTIFIC

Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 4939
Step Size = 0.50 eV. 200 Scans of 50 channels at 50 ms per chan



GL-4-151B-R-B CM 15D/H MG300 NR
OPT SI2P+MECA
10H45 29 NOV 89

Pd/HZSM-5(A)

Sample No. 180 (3.00% Pd)

Prepared by gas phase adsorption

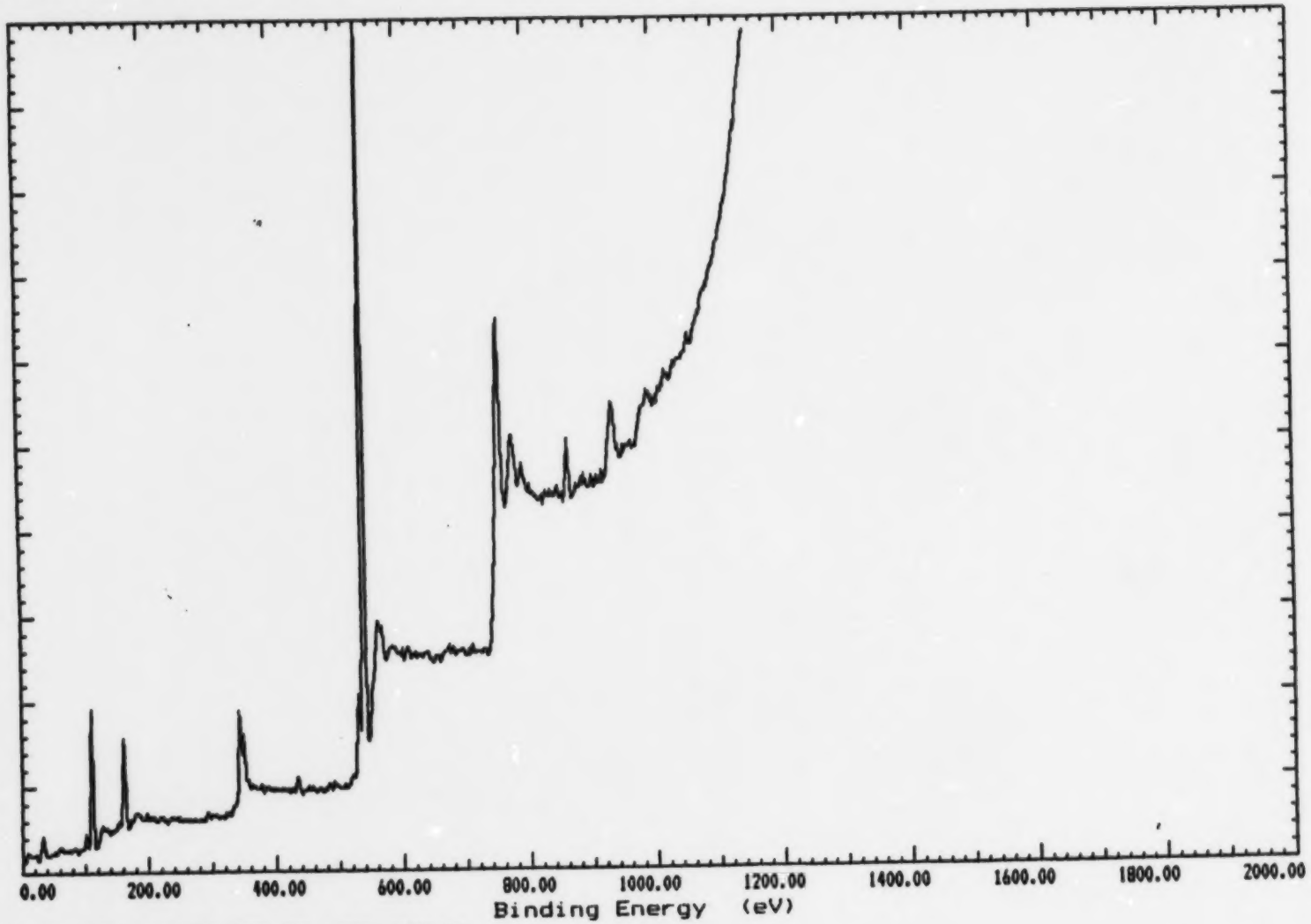
Pd/HZSM-5(AB)

Sample No. 180 (3.00% Pd)

CALCINED

ASA32 Region 1 SURVEY VG SCIENTIFIC

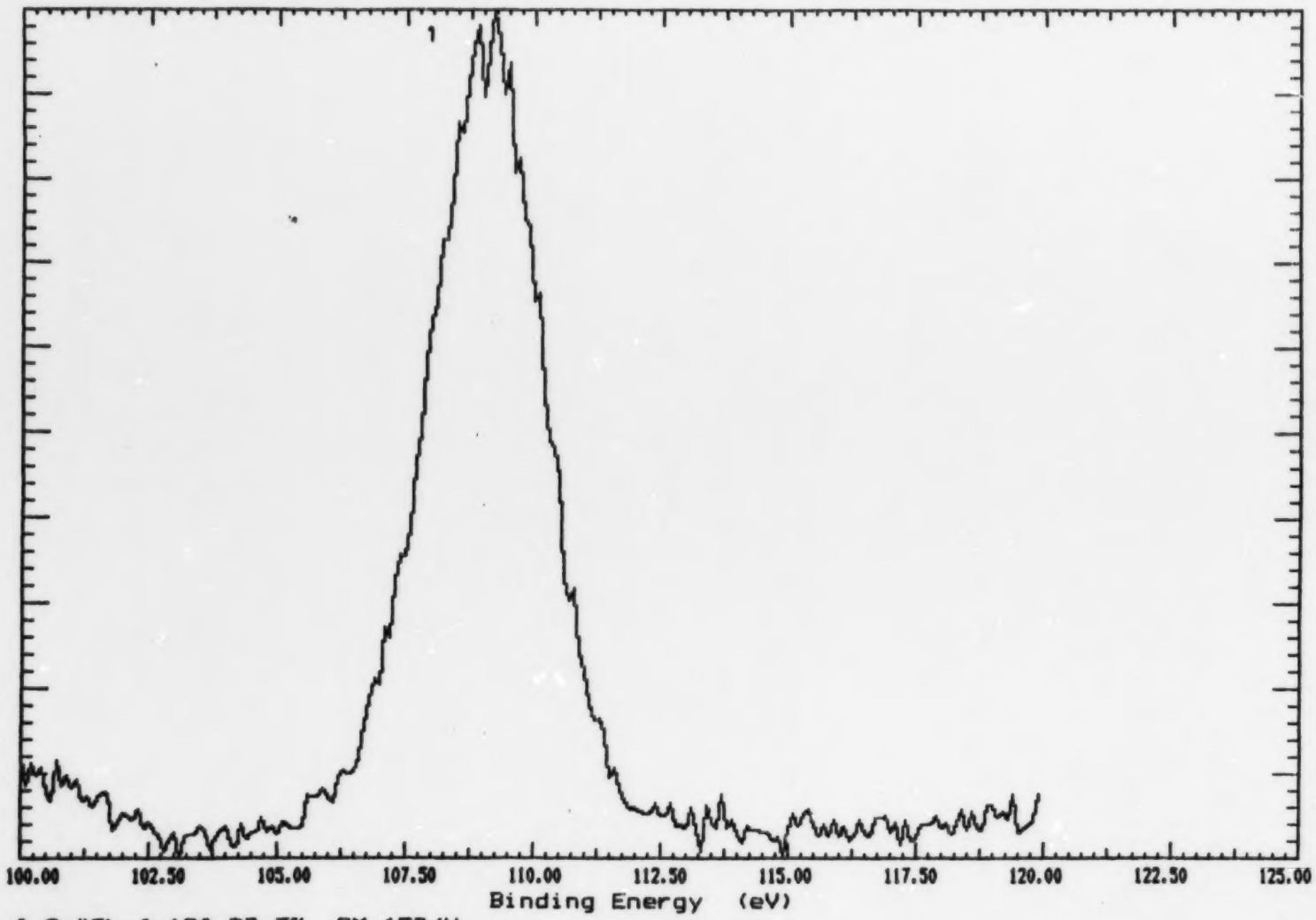
Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 50715
Step Size = 1.00 eV. 5 Scans of 1150 channels at 50 ms per chan



A.S.#GL-4-180 PD-3% CM 15D/H
MG300W NR C1 OPT.SI2P +MECA
22 MARS 90 17H18

ASA32 Region 2 SI2P VG SCIENTIFIC

Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 1586
Step Size = 0.10 eV. 15 Scans of 200 channels at 50 ms per chan

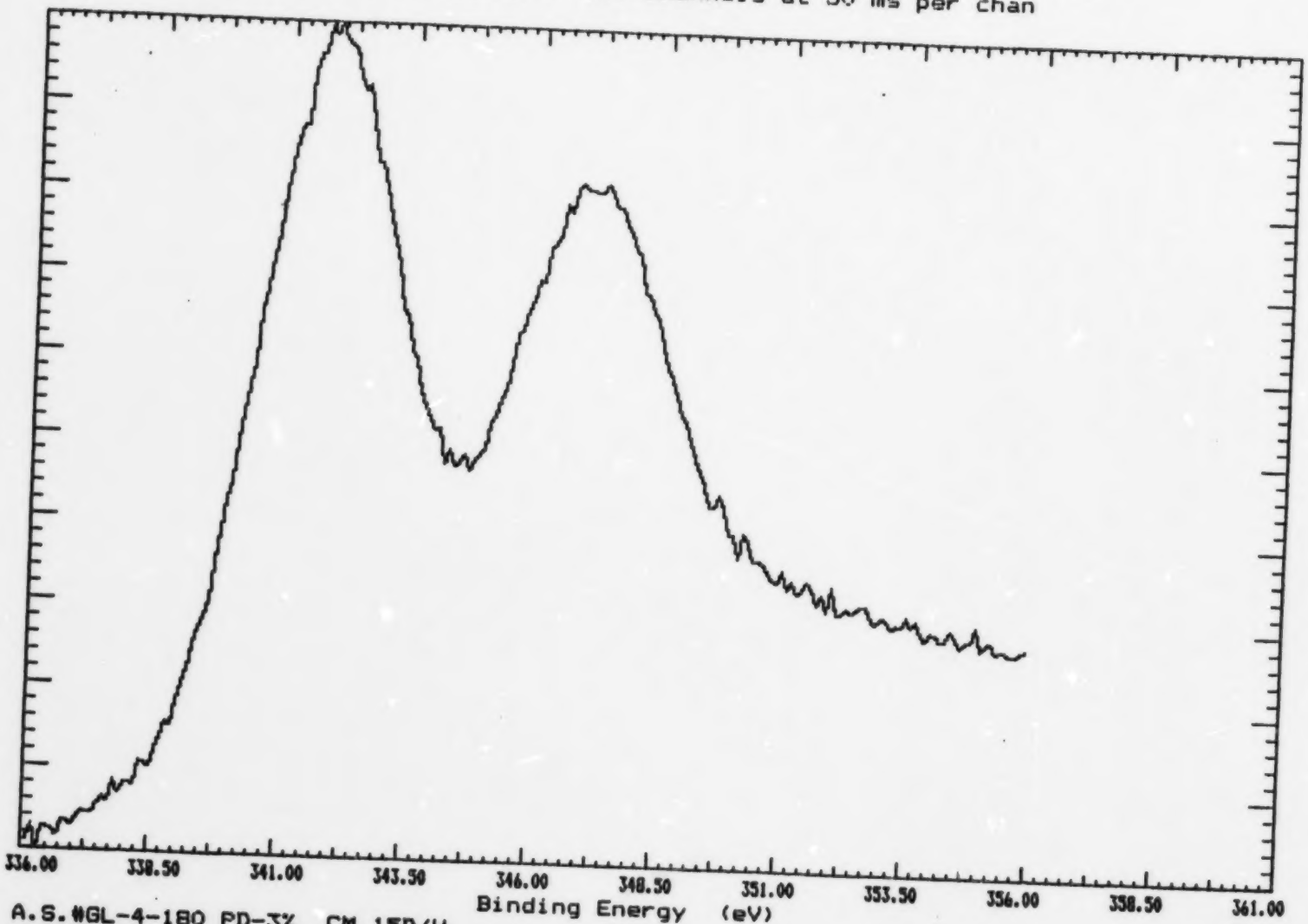


A.S.#GL-4-180 PD-3% CM 15D/H
MG300W NR C1 OPT.SI2P +MECA
22 MARS 90 17H18

ASA32 Region 3 PD3D

VG SCIENTIFIC

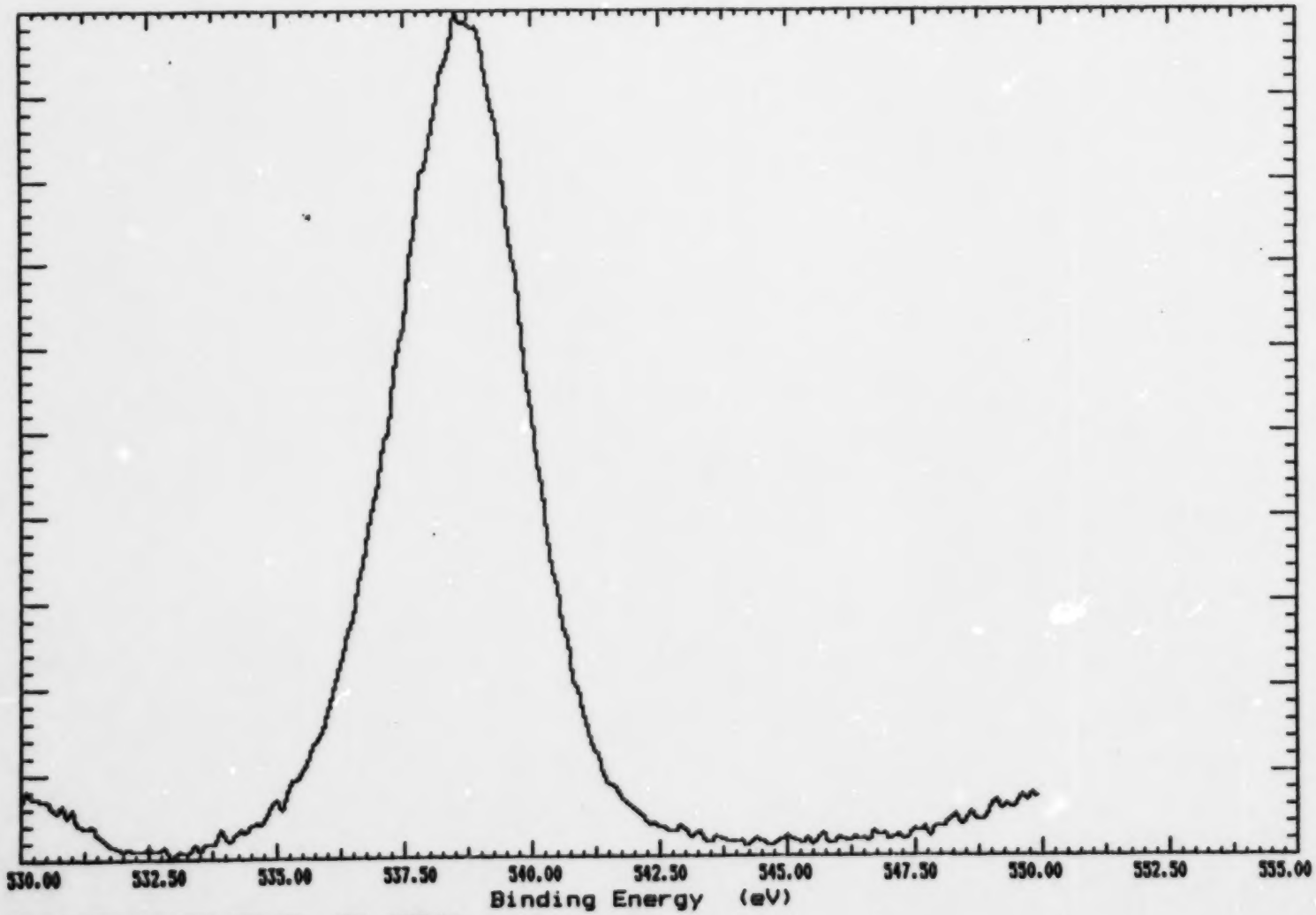
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 976
Step Size = 0.10 eV. 300 Scans of 200 channels at 50 ms per chan



A.S.#GL-4-180 PD-3% CM 15D/H
MG300W NR C1 OPT.SI2P +MECA
22 MARS 90 17H18

ASA32 Region 4 O1S VG SCIENTIFIC

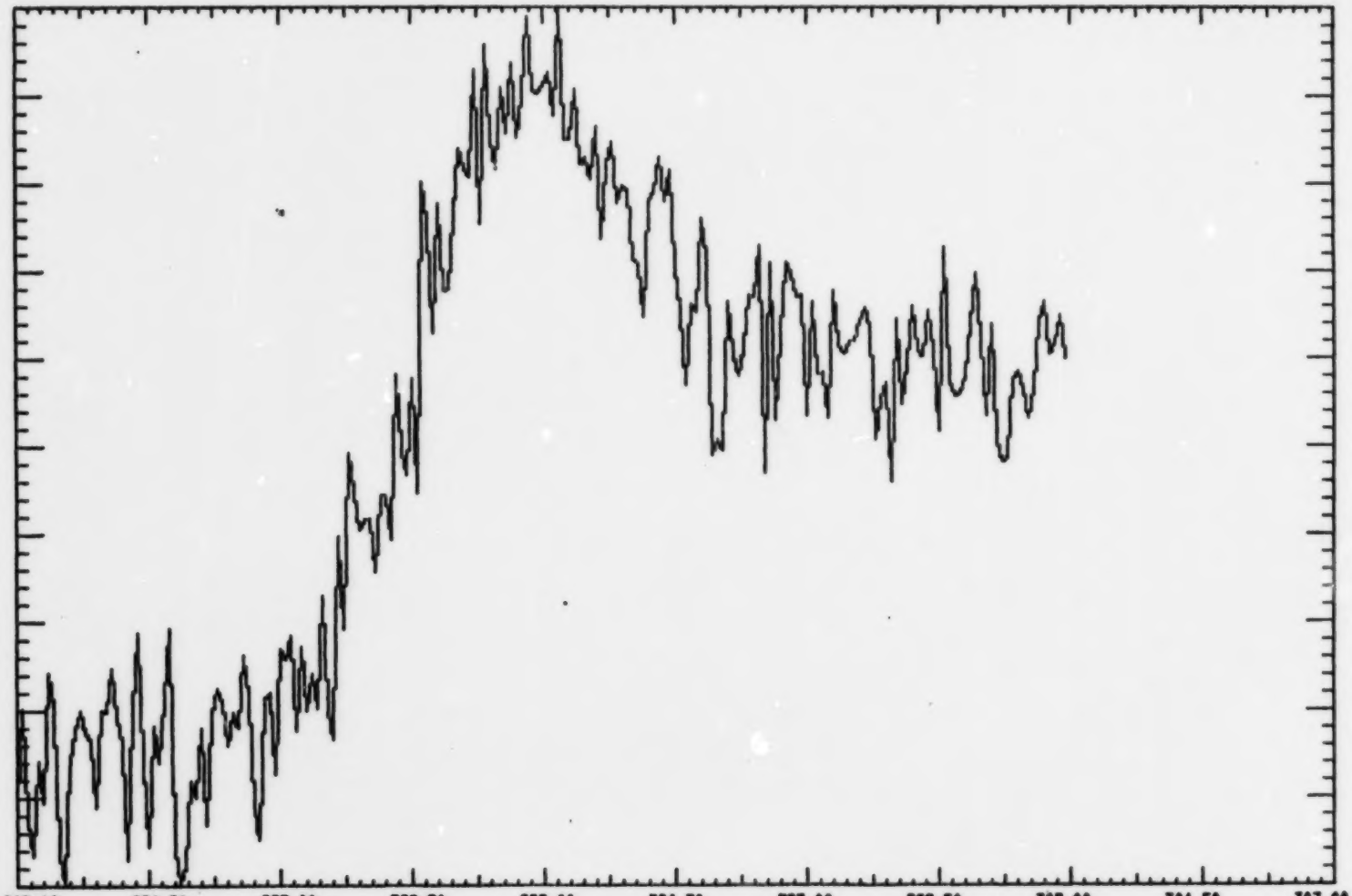
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 9118
Step Size = 0.10 eV. 15 Scans of 200 channels at 50 ms per chan



A.S.#GL-4-180 PD-3% CM 15D/H
M8300W NR C1 OPT.SI2P +MECA
22 MARS 90 17H18

ASA32 Region 5 C1S VG SCIENTIFIC

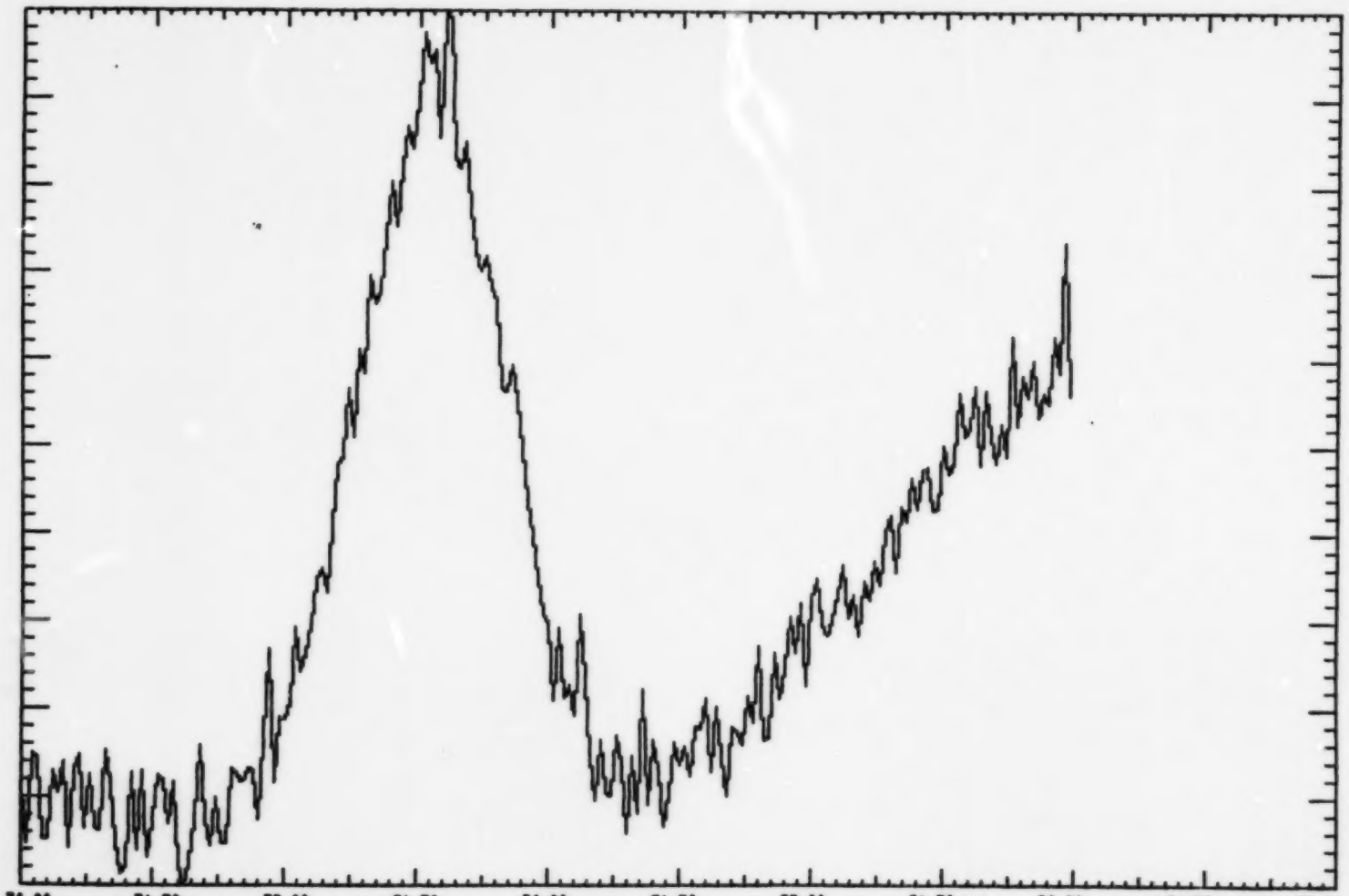
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 51
Step Size = 0.10 eV. 1000 Scans of 200 channels at 50 ms per chan



A.S.#GL-4-180 PD-3% CM 15D/H
MG300W NR C1 OPT.SI2P +MECA
22 MARS 90 17H18

ASA32 Region 6 AL2P VG SCIENTIFIC

Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 51
Step Size = 0.10 eV. 1000 Scans of 200 channels at 50 ms per chan

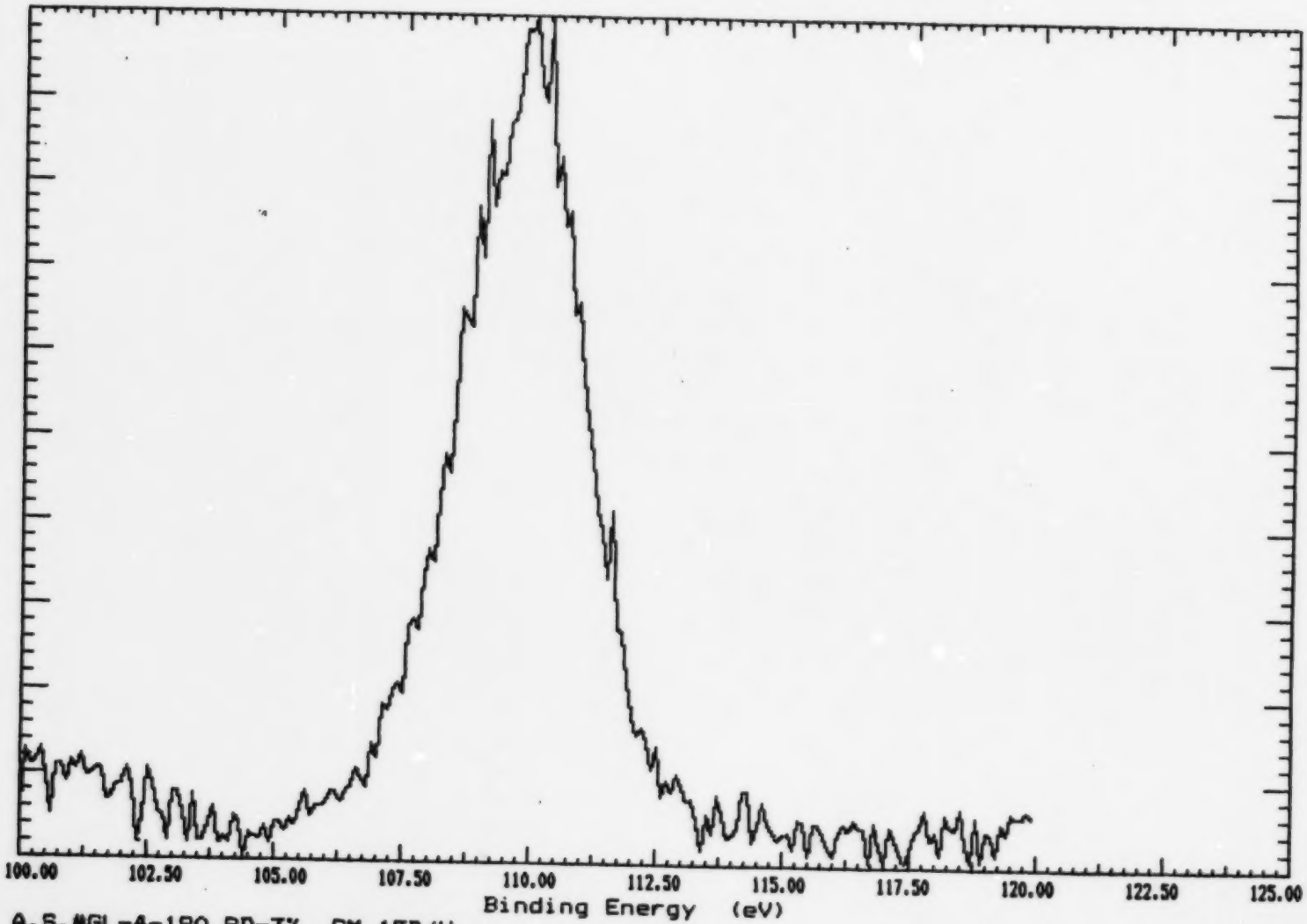


A.S.#GL-4-180 PD-3% CM 15D/H
MG300W NR C1 OPT.SI2P +MECA
22 MARS 90 17H18

ASA32 Region 7 SI2P

VG SCIENTIFIC

Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 1502
Step Size = 0.10 eV. 7 Scans of 200 channels at 50 ms per chan



A.S.#GL-4-180 PD-3% CM 15D/H
MG300W NR C1 OPT.SI2P +MECA
22 MARS 90 17H18

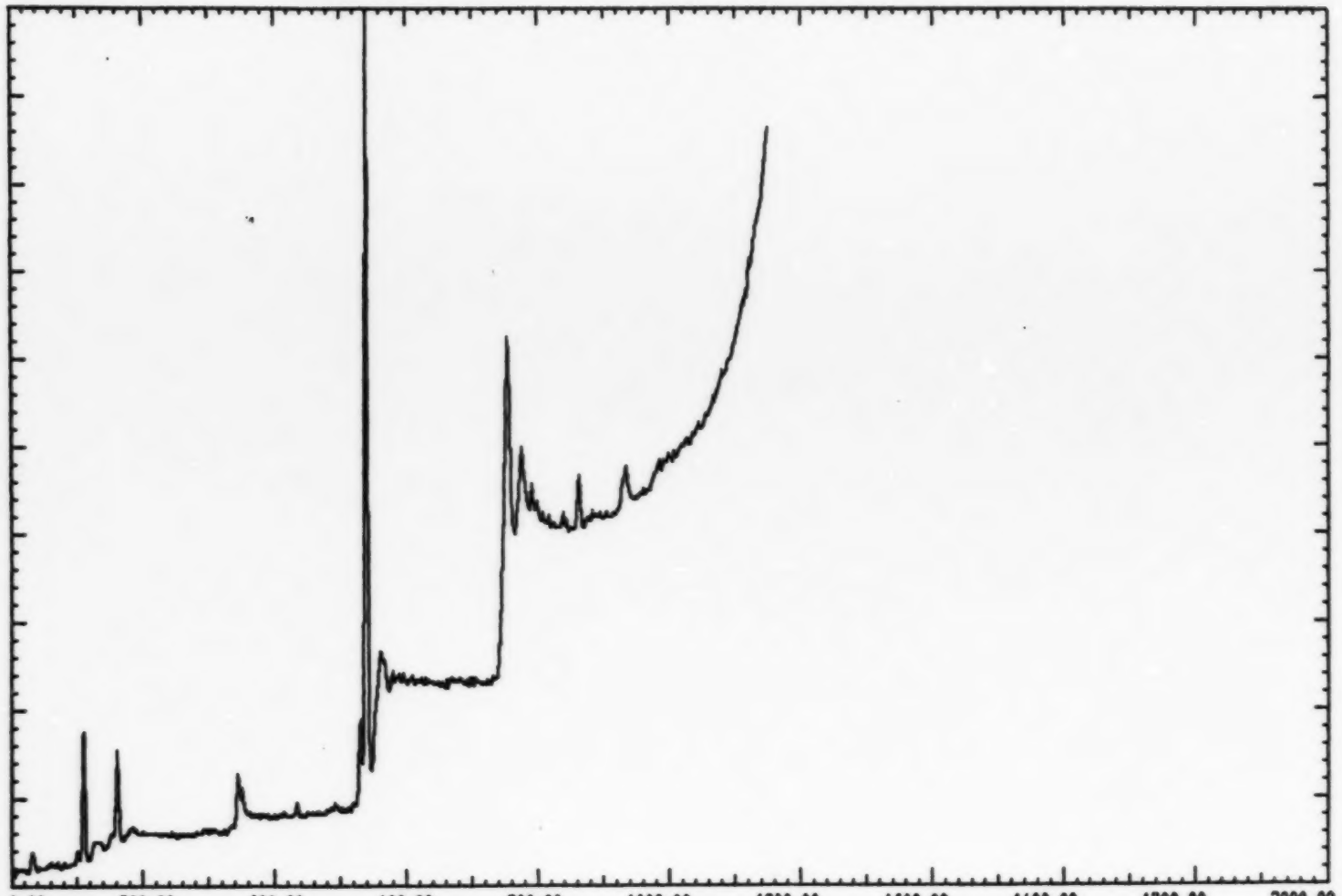
Pd/HZSM-5(A)

Sample No. 180 (3.00% Pd)

CALCINED AND GROUND

ASA33 Region 1 SURVEY VG SCIENTIFIC

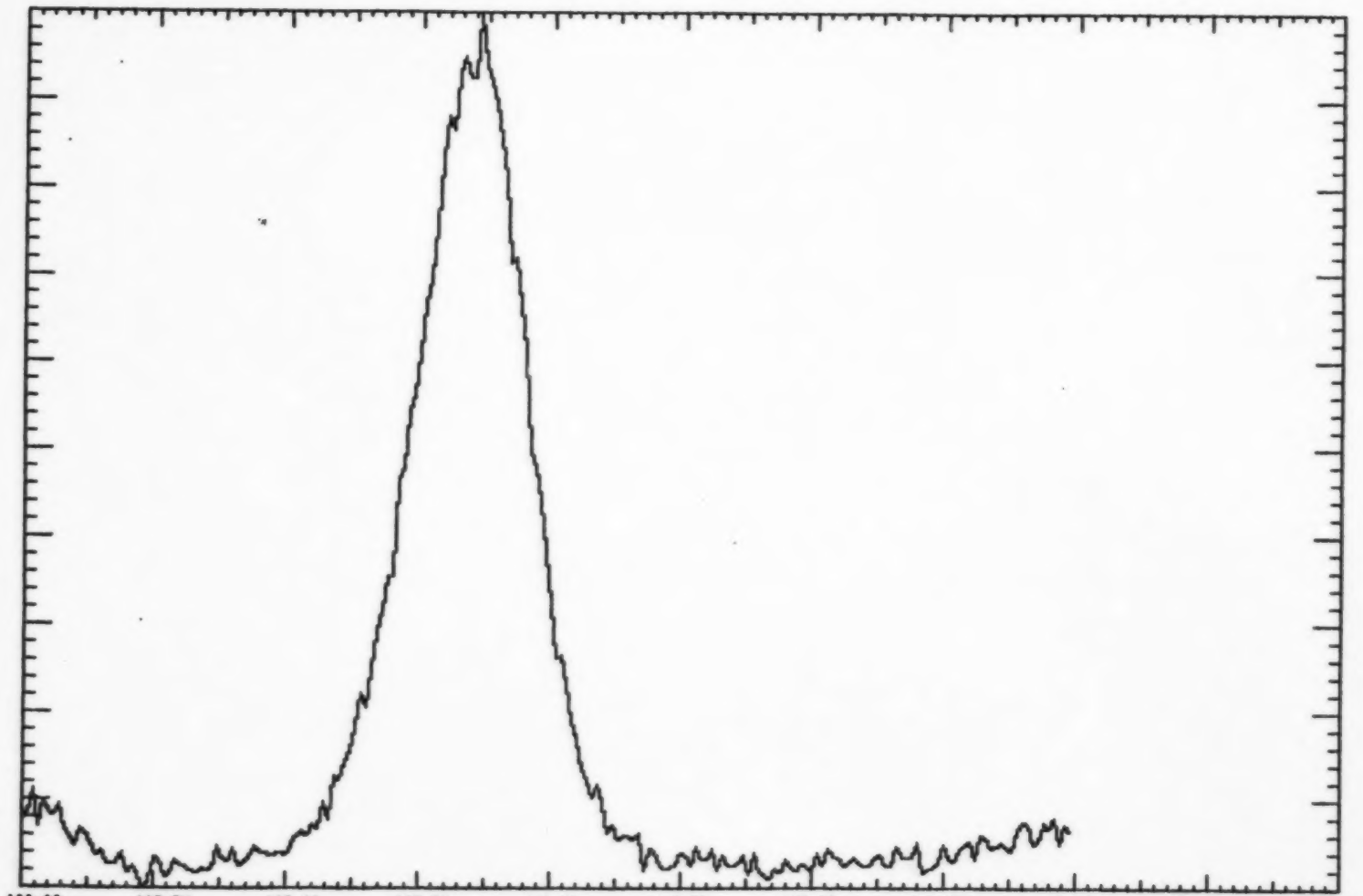
Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 73027
Step Size = 1.00 eV. 5 Scans of 1150 channels at 50 ms per chan



GL-4-180-BROYE CM 15D/H MG300 C1 NR
OPT SI2P+MECA
17H05 27 MARS 90

ASA33 Region 2 SI2P VG SCIENTIFIC

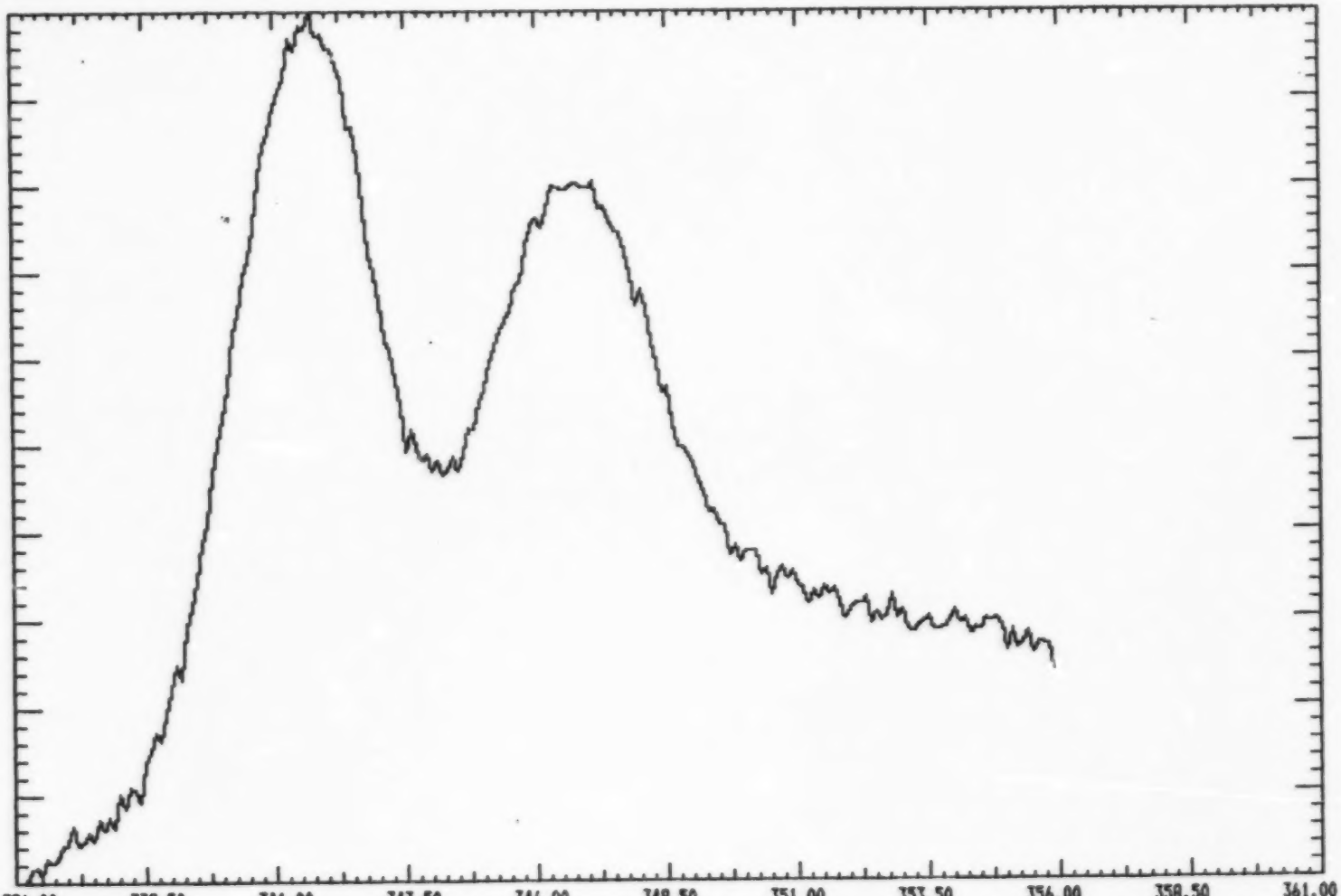
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 2602
Step Size = 0.10 eV. 15 Scans of 200 channels at 50 ms per chan



GL-4-180-BROYE CM 15D/H MG300 C1 NR
OPT SI2P+MECA
17H05 27 MARS 90

ASA33 Region 3 PD3D VG SCIENTIFIC

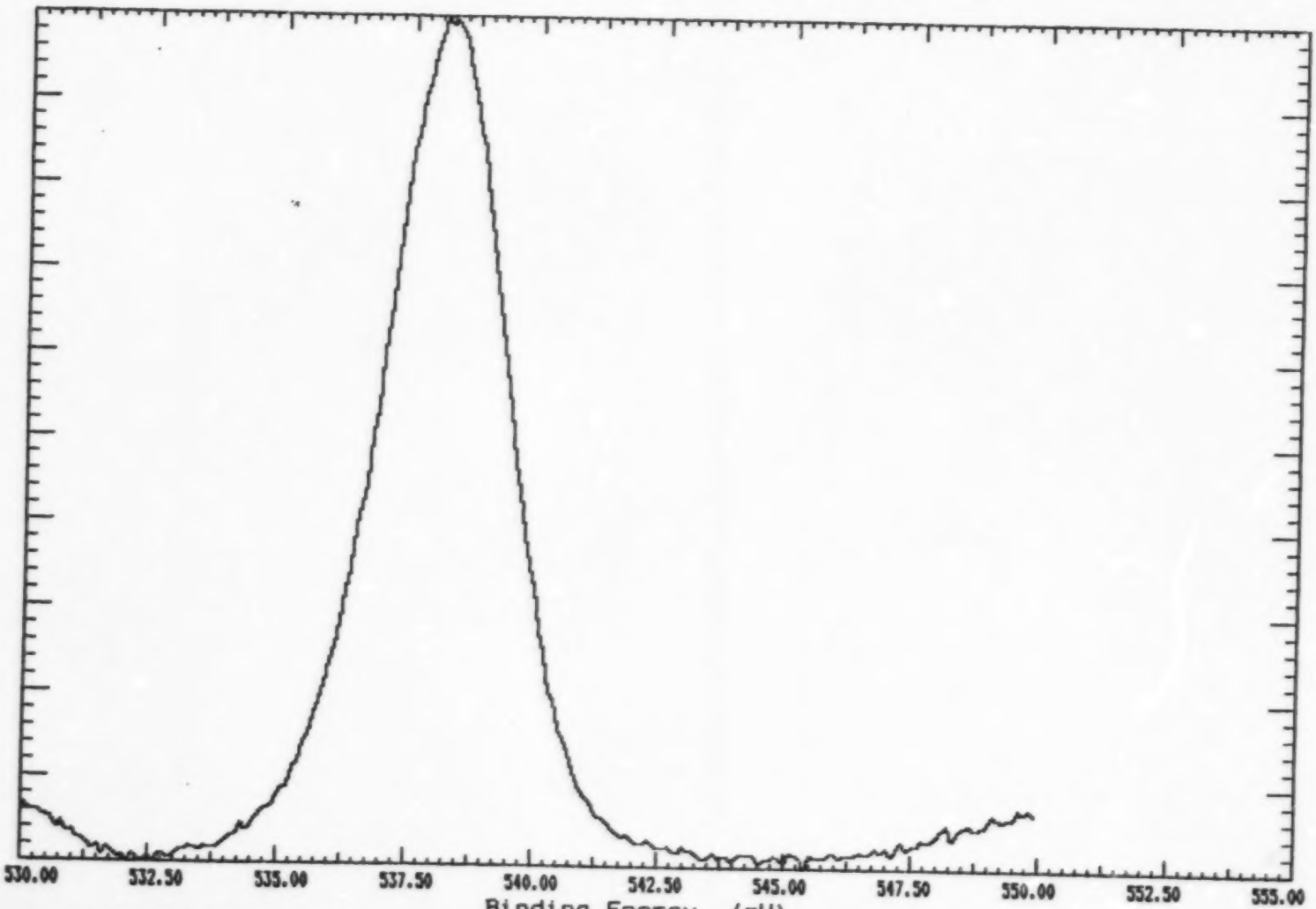
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 917
Step Size = 0.10 eV. 300 Scans of 200 channels at 50 ms per chan



GL-4-180-BROYE CM 15D/H MG300 C1 NR
OPT SI2P+MECA
17H05 27 MARS 90

ASA33 Region 4 01S VG SCIENTIFIC

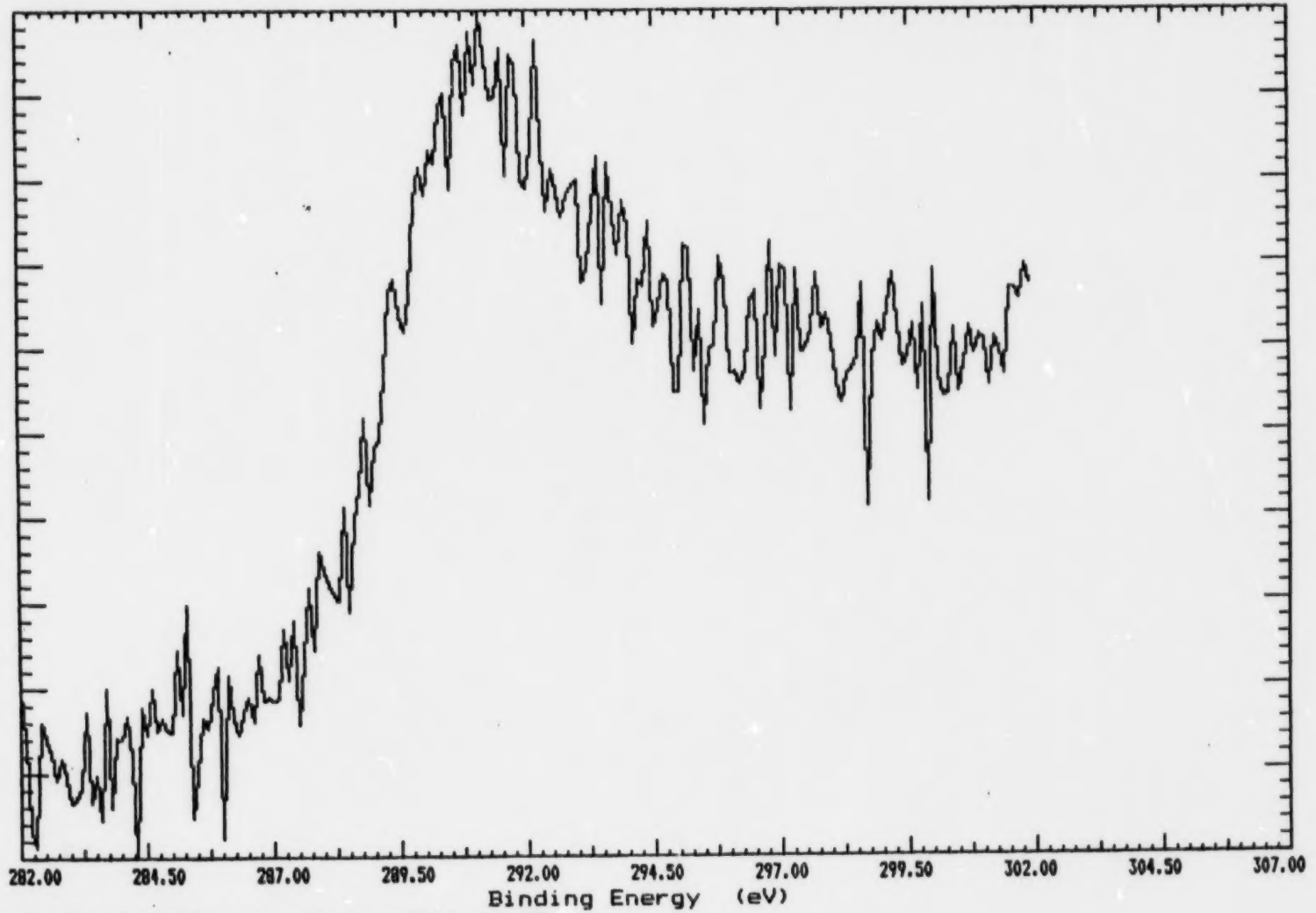
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 15306
Step Size = 0.10 eV. 15 Scans of 200 channels at 50 ms per chan



GL-4-180-BROYE CM 15D/H MG300 C1 NR
OPT SI2P+MECA
17H05 27 MARS 90

ASA33 Region 5 C1S VG SCIENTIFIC

Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 58
Step Size = 0.10 eV. 1500 Scans of 200 channels at 50 ms per chan



GL-4-180-BROYE CM 15D/H MG300 C1 NR
OPT SI2P+MECA
17H05 27 MARS 90

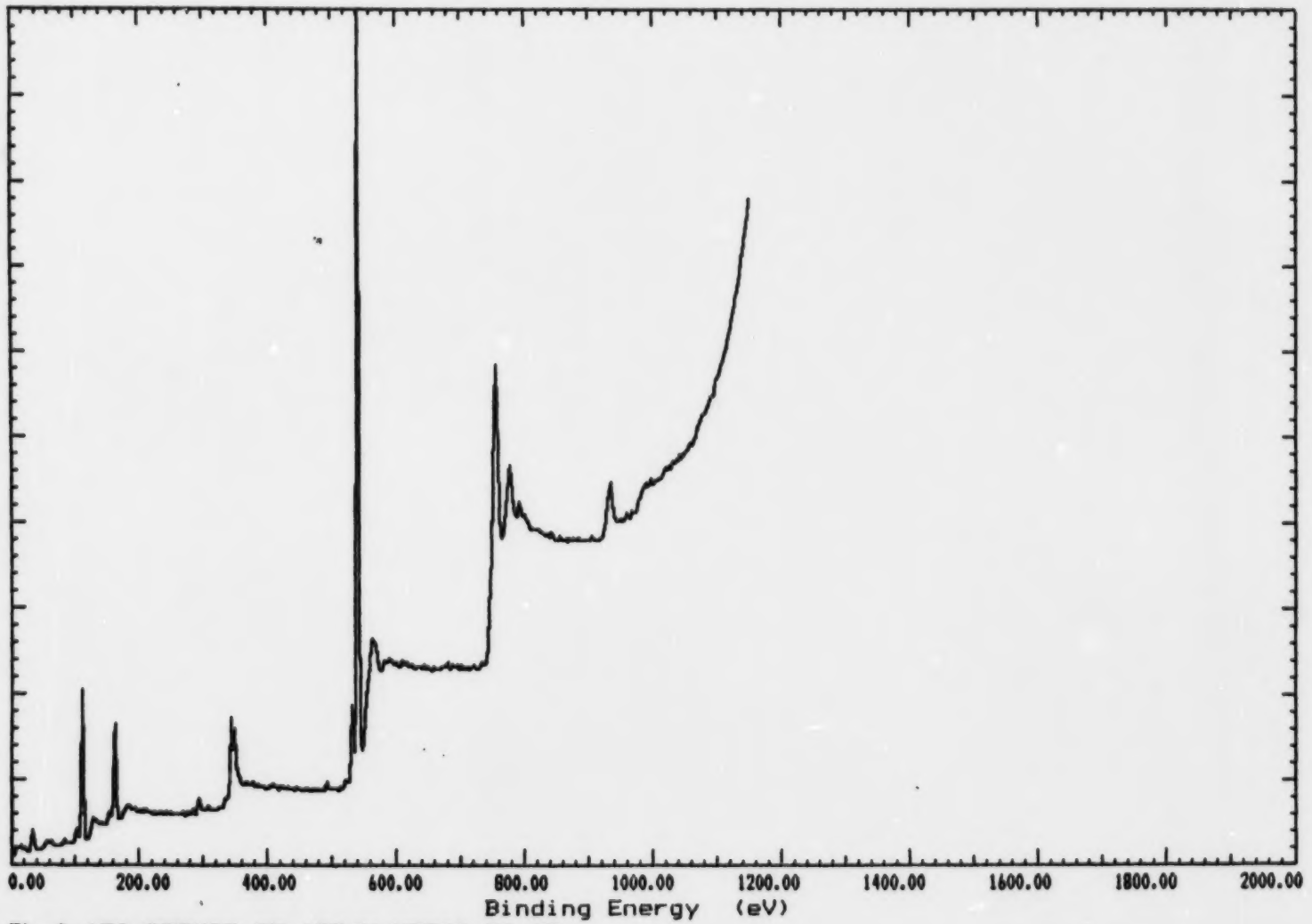
Pd/HZSM-5(AB)

Sample No. 180 (3.00% Pd)

REDUCED

ASA50 Region 1 SURVEY VG SCIENTIFIC

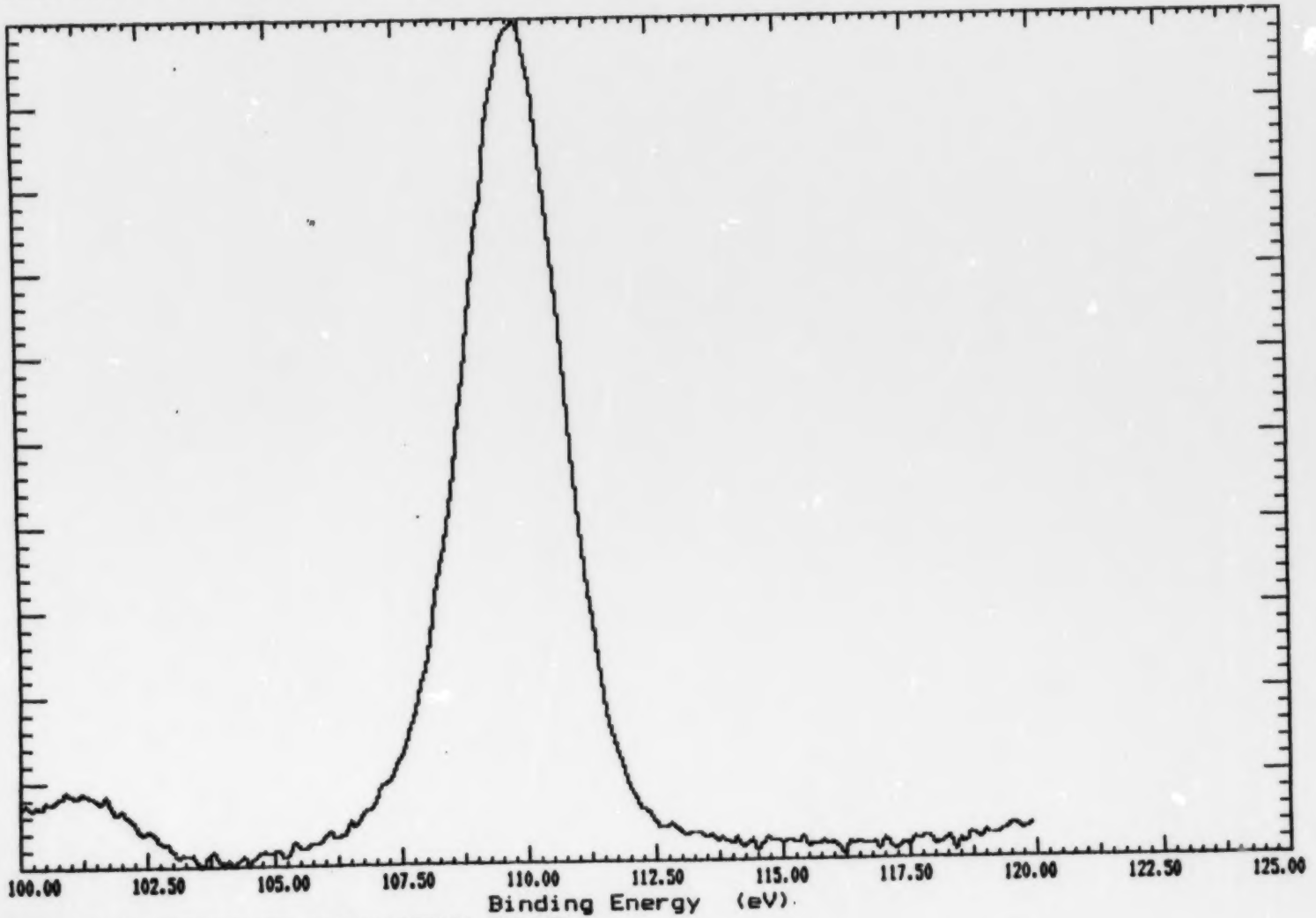
Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 198207
Step Size = 1.00 eV. 5 Scans of 1150 channels at 50 ms per chan



GL-4-180 REDUIT CM 15D/H MG300 C1 NR
OPT SI2P+MECA V=1*10-7
13H50 16 MAI 90

ASA50 Region 2 SI2P VG SCIENTIFIC

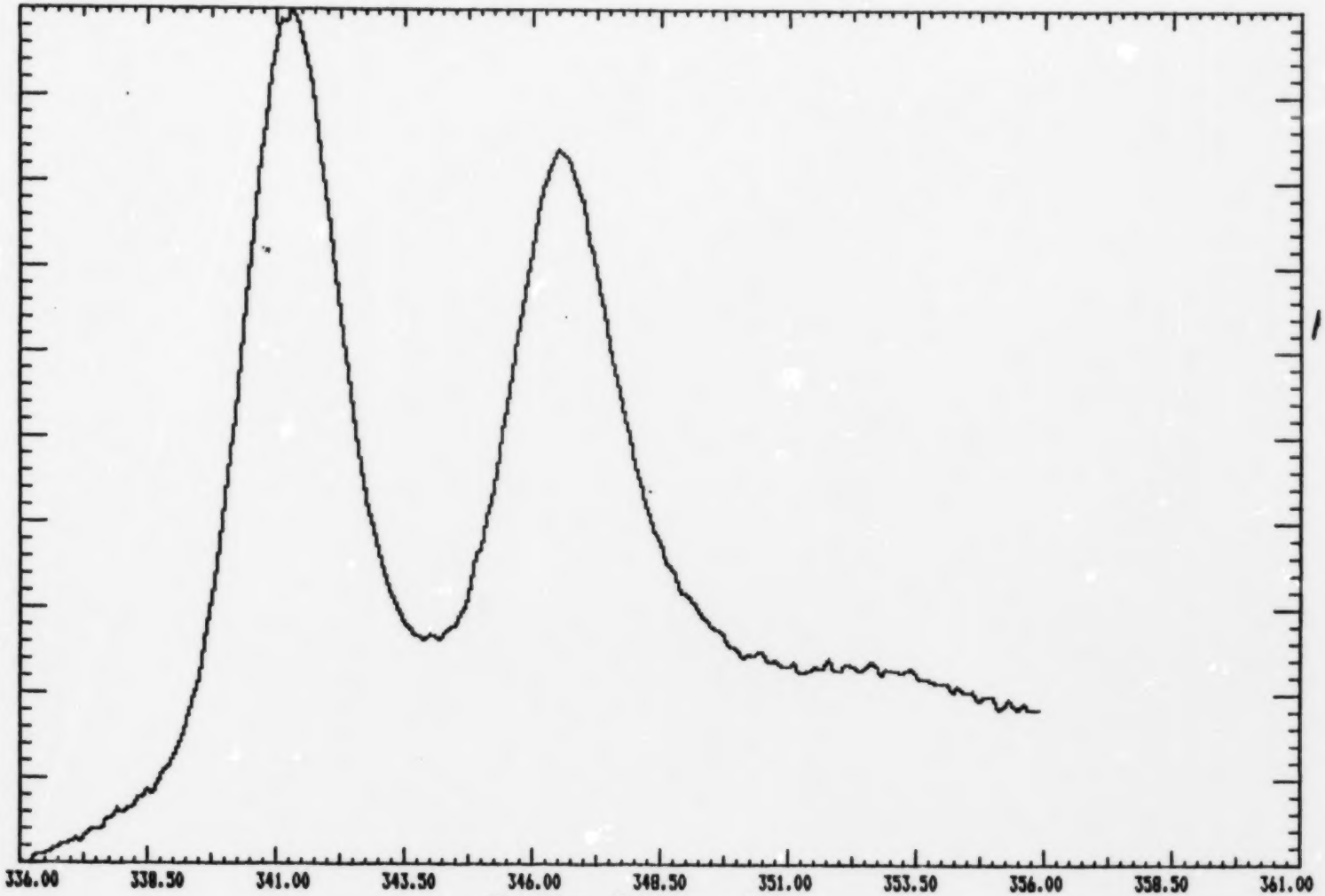
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 9030
Step Size = 0.10 eV. 20 Scans of 200 channels at 50 ms per chan



GL-4-180 REDUIT CM 15D/H MG300 C1 NR
OPT SI2P+MECA V=1*10-7
13H50 16 MAI 90

ASA50 Region 3 PD3D VG SCIENTIFIC

Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 5144
Step Size = 0.10 eV. 245 Scans of 200 channels at 50 ms per chan

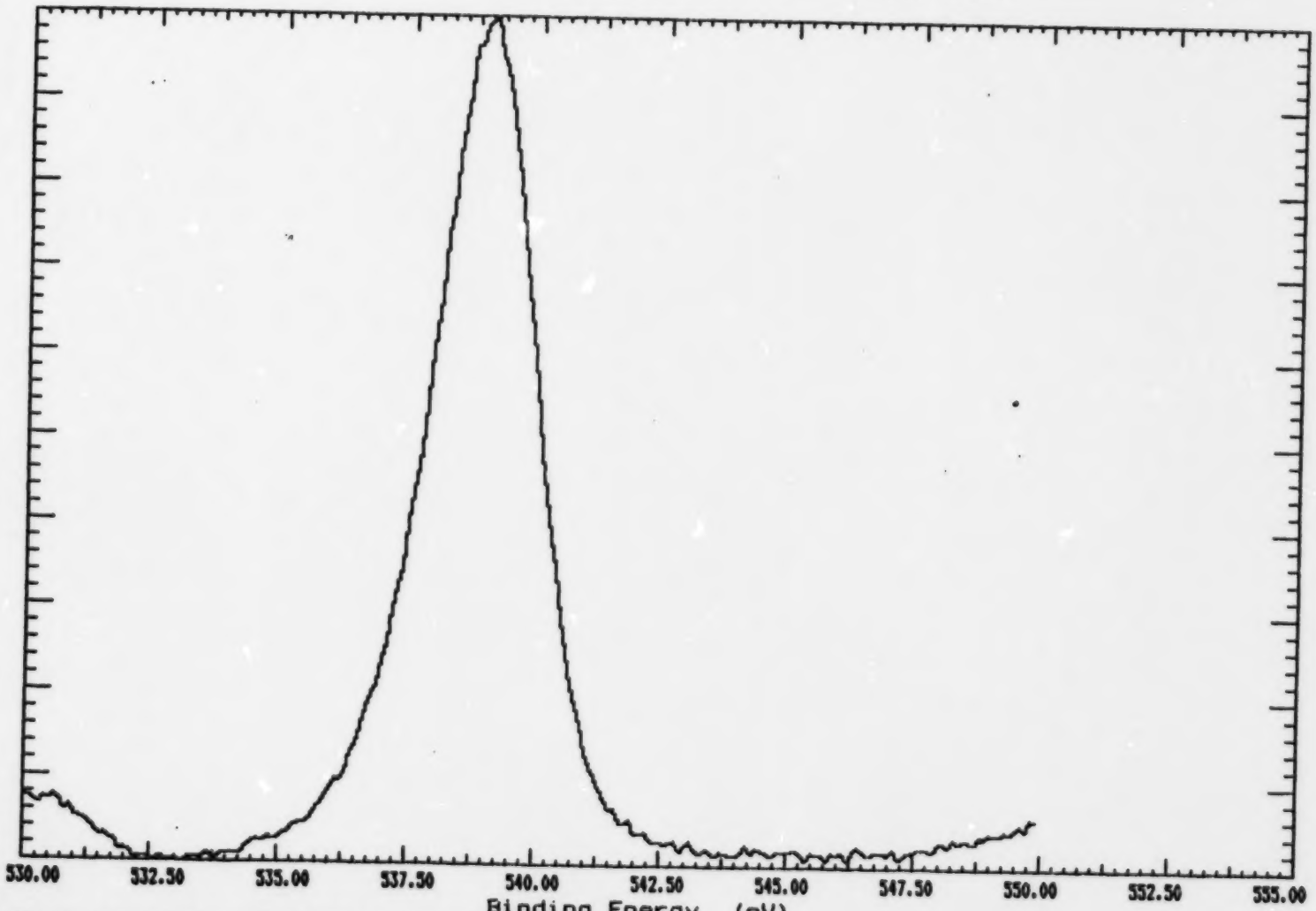


GL-4-180 REDUIT CM 15D/H MG300 C1 NR
OPT SI2P+MECA V=1*10-7
13H50 16 MAI 90

ASA50 Region 4 01S

VG SCIENTIFIC

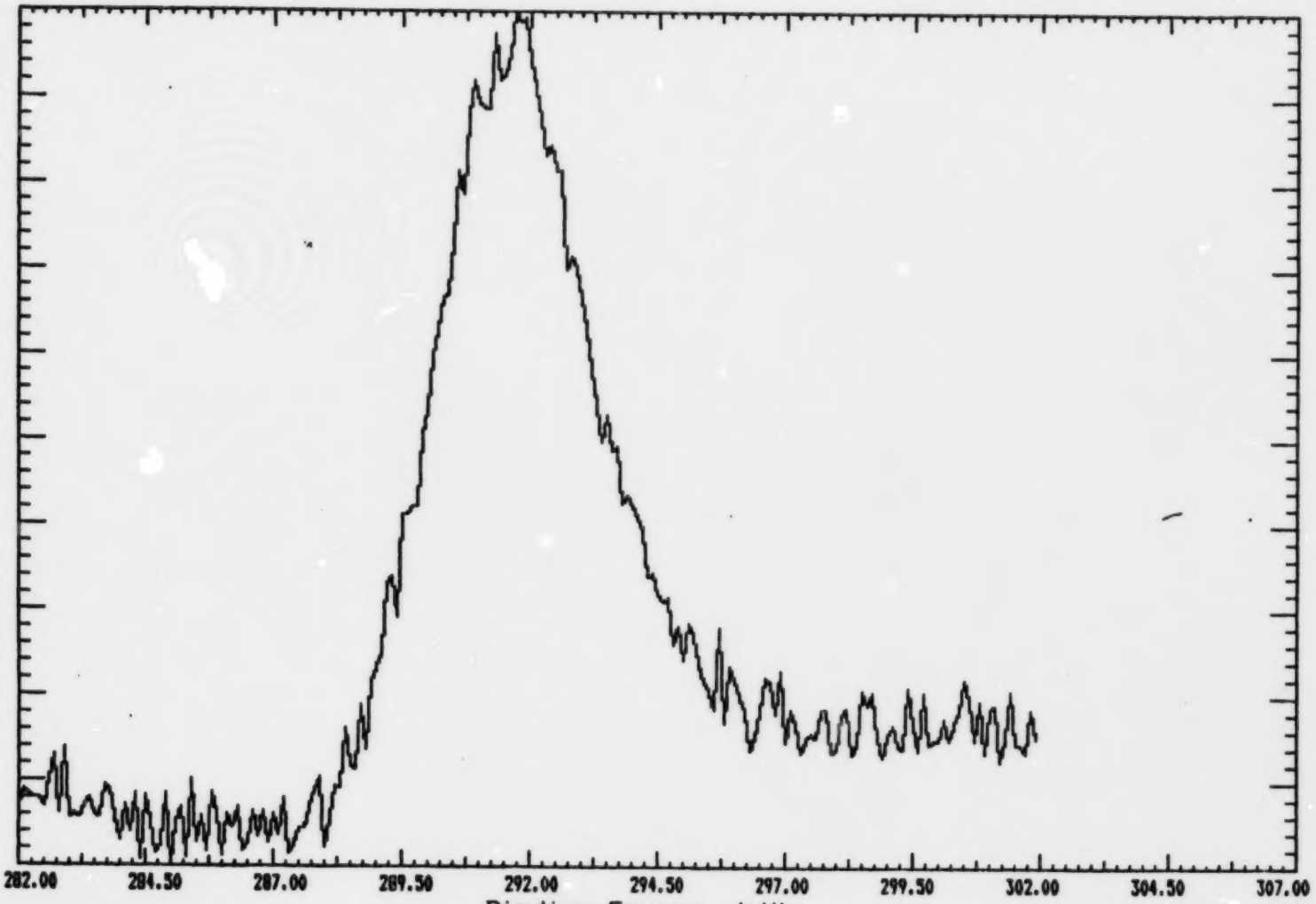
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 46663
Step Size = 0.10 eV. 6 Scans of 200 channels at 50 ms per chan



GL-4-180 REDUIT CM 15D/H MG300 C1 NR
OPT SI2P+MECA V=1*10-7
13H50 16 MAI 90

ASA50 Region 5 C1S VG SCIENTIFIC

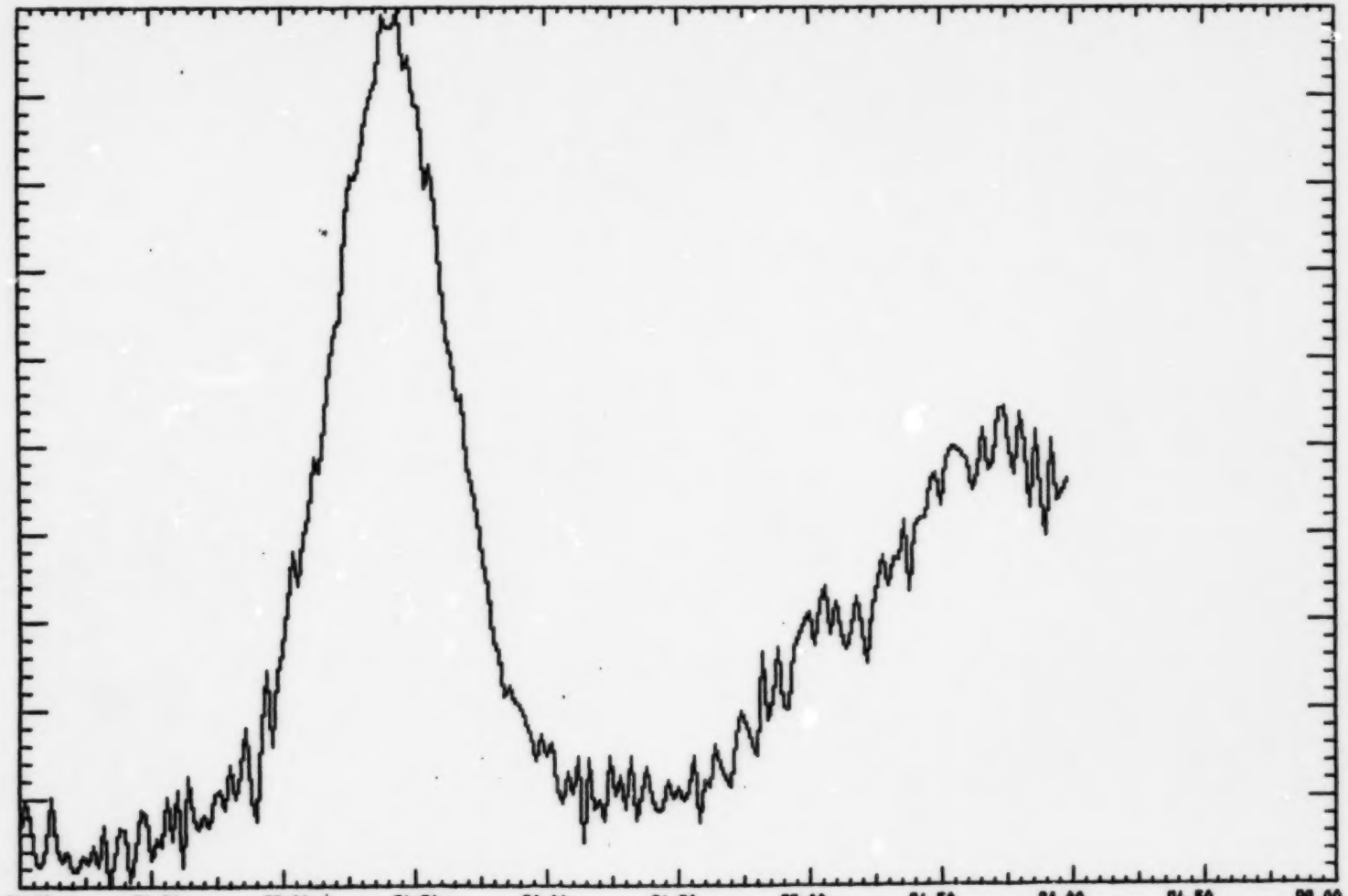
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 1033
Step Size = 0.10 eV. 89 Scans of 200 channels at 50 ms per chan



GL-4-180 REDUIT CM 15D/H MG300 C1 NR
OPT SI2P+MECA V=1*10-7
13H50 16 MAI 90

ASA50 Region 6 AL2P VG SCIENTIFIC

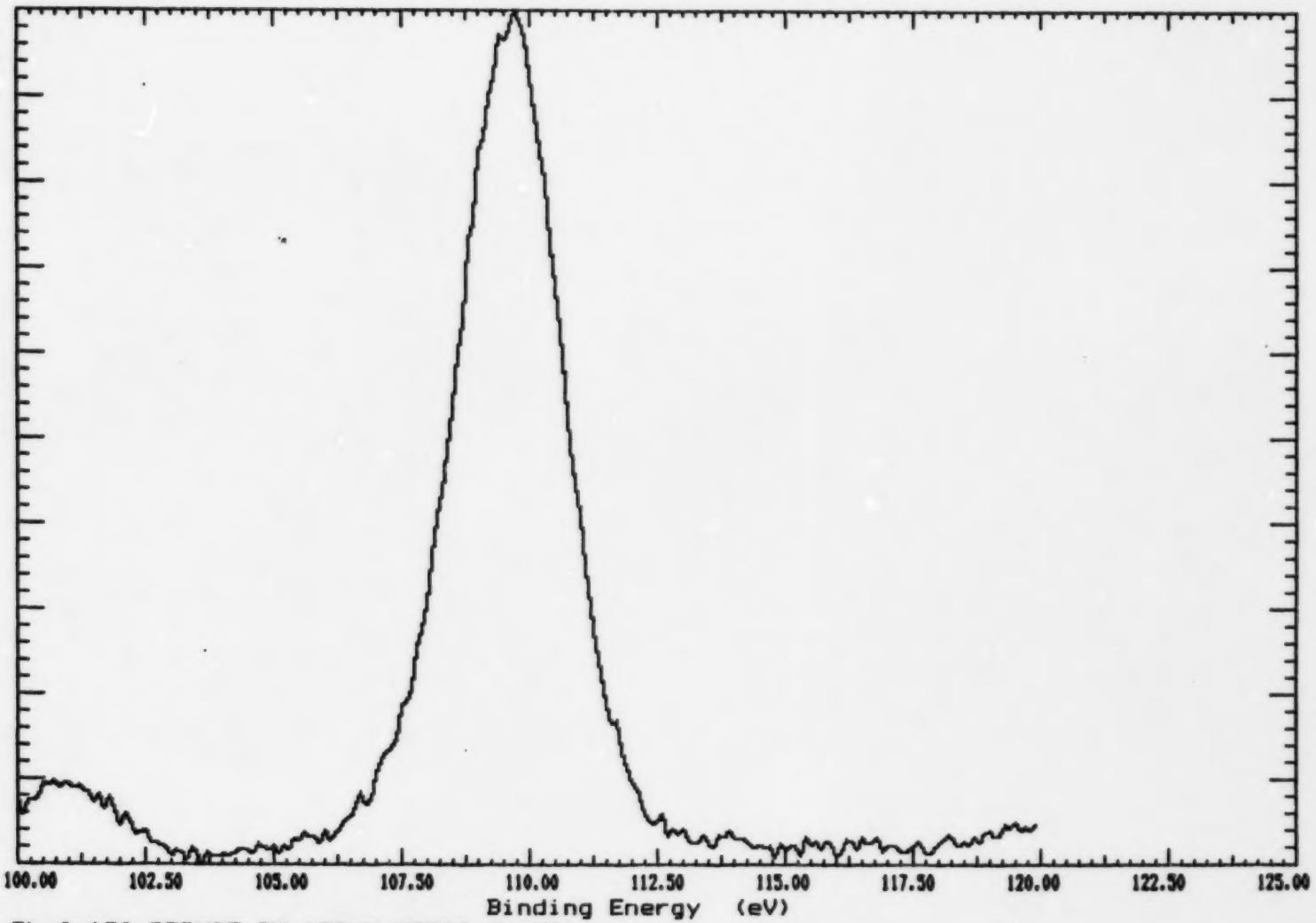
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 313
Step Size = 0.10 eV. 268 Scans of 200 channels at 50 ms per chan



GL-4-180 REDUIT CM 15D/H MG300 C1 NR
OPT SI2P+MECA V=1*10-7
13H50 16 MAI 90

ASA50 Region 7 SI2P VG SCIENTIFIC

Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 8751
Step Size = 0.10 eV. 10 Scans of 200 channels at 50 ms per chan



GL-4-180 REDUIT CM 15D/H MG300 C1 NR
OPT SI2P+MECA V=1*10-7
13H50 16 MAI 90

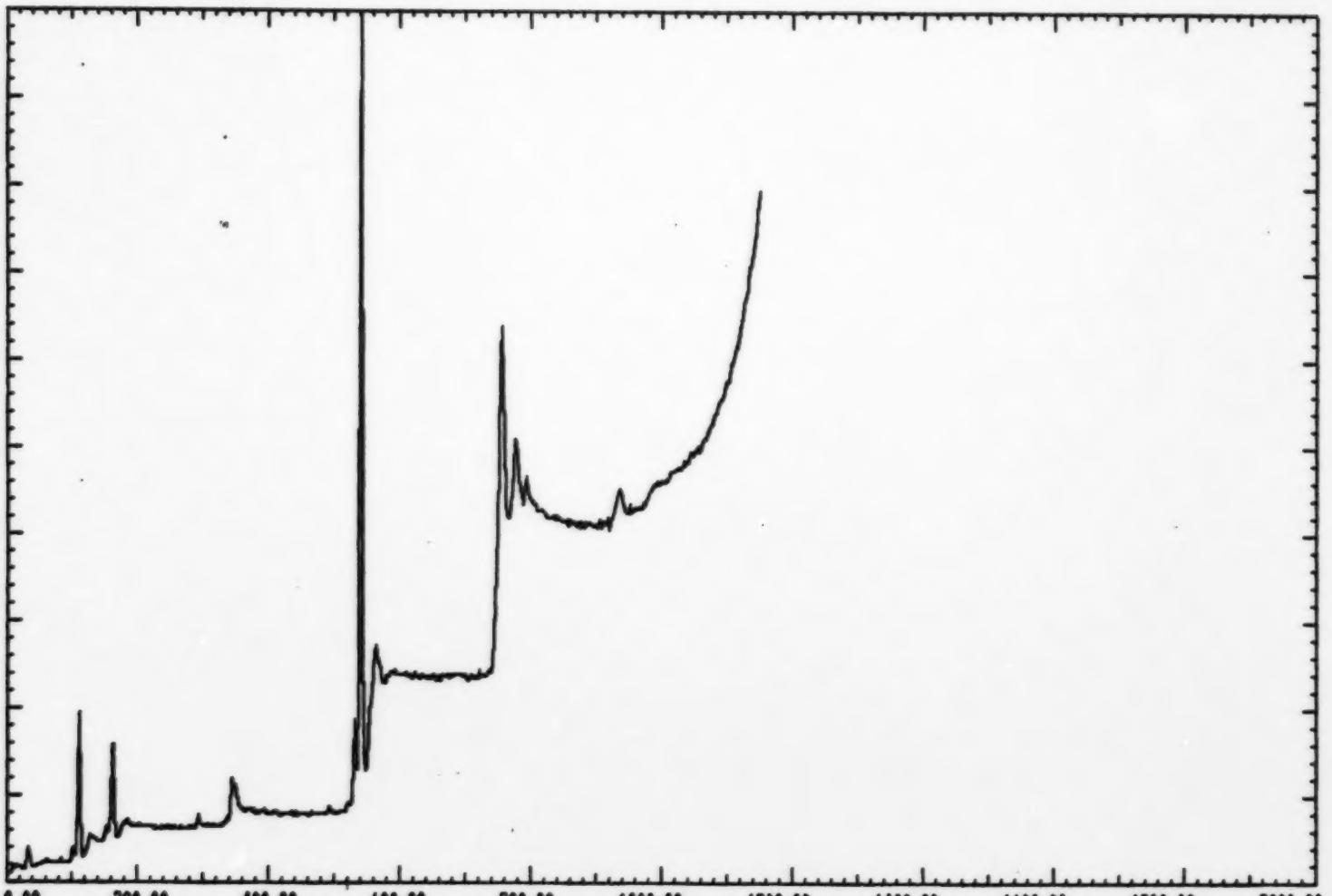
Pd/HZSM-5(A)

Sample No. 180 (3.00% Pd)

REDUCED AND GROUND

ASAS1 Region 1 SURVEY VG SCIENTIFIC

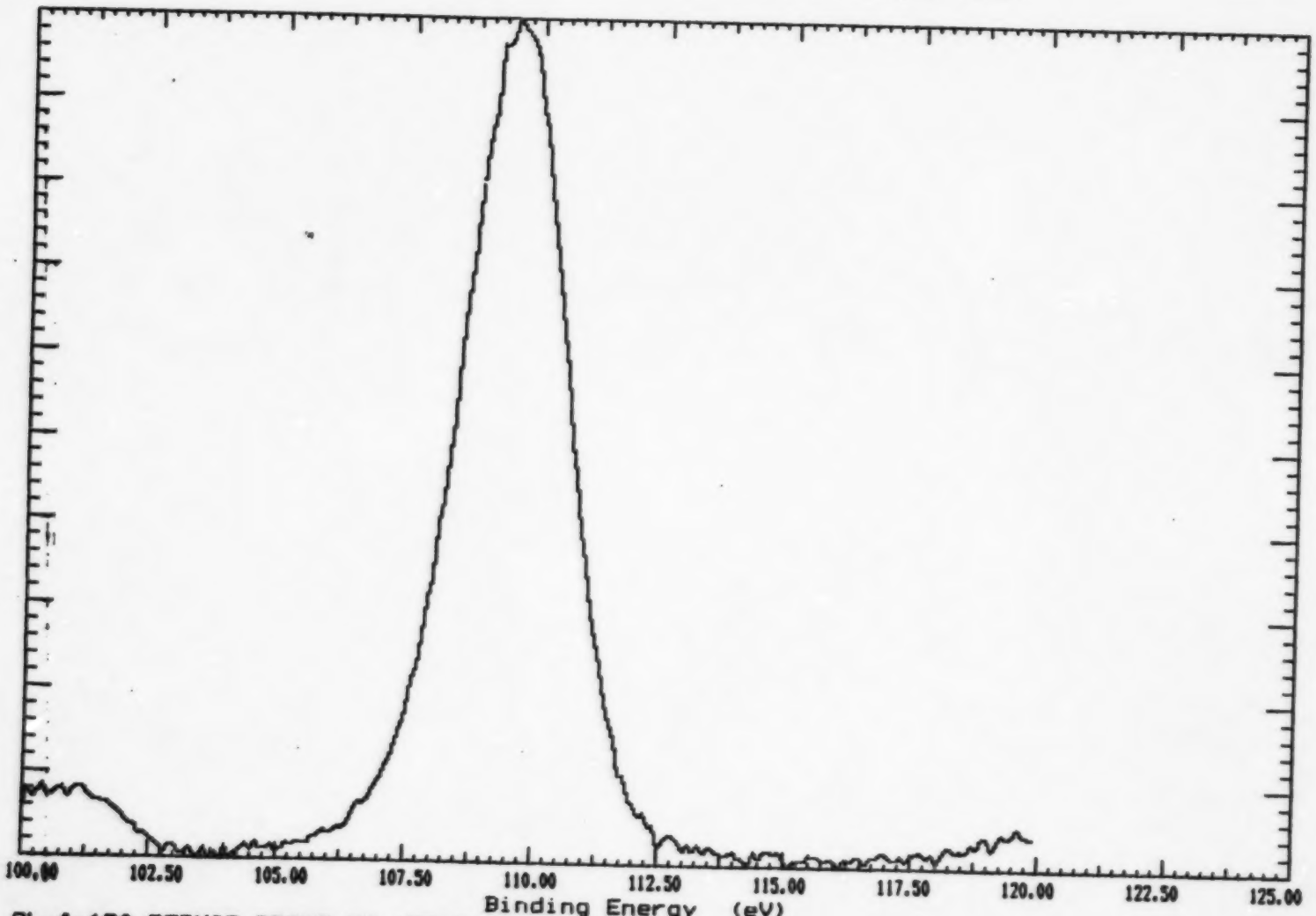
Mg XPS Analyser Energy = 50 eV Max Plotted Count Rate = 165247
Step Size = 1.00 eV. 5 Scans of 1150 channels at 50 ms per chan



GL-4-180 REDUIT BROYE CM 15D/H MG300 NR
C1 OPT SI2P+MECA 2*10-7
8H45 17 MAI 90

ASA51 Region 2 SI2P VG SCIENTIFIC

Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 7351
Step Size = 0.10 eV. 20 Scans of 200 channels at 50 ms per chan

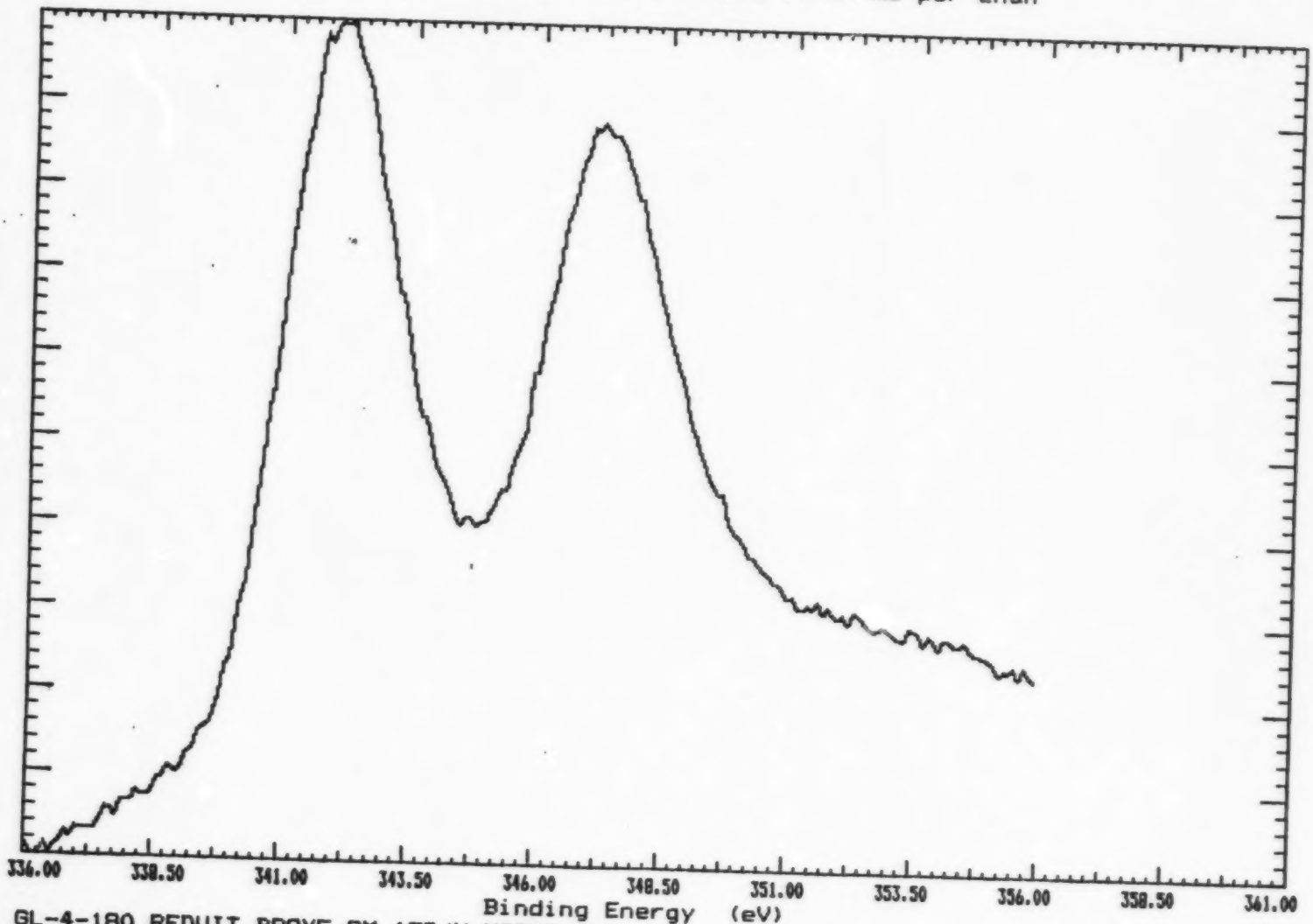


GL-4-180 REDUIT BROYE CM 15D/H MG300 NR
C1 OPT SI2P+MECA 2*10-7
BH45 17 MAI 90

ASA51 Region 3 PD3D

VG SCIENTIFIC

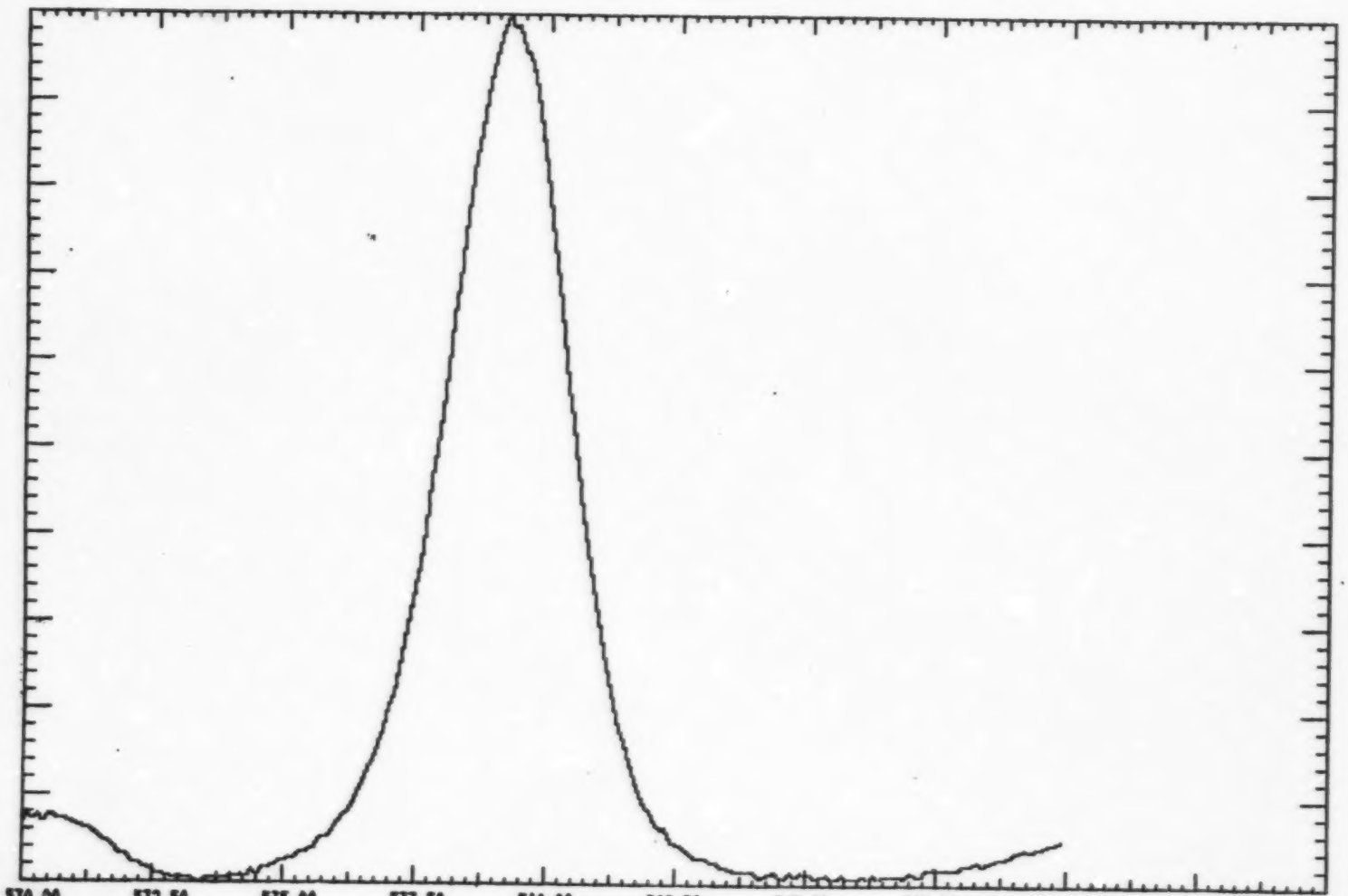
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 2225
Step Size = 0.10 eV. 250 Scans of 200 channels at 50 ms per chan



GL-4-180 REDUIT BROYE CM 15D/H MG300 NR
C1 OPT SI2P+MECA 2*10-7
8H45 17 MAI 90

ASA51 Region 4 O1S VG SCIENTIFIC

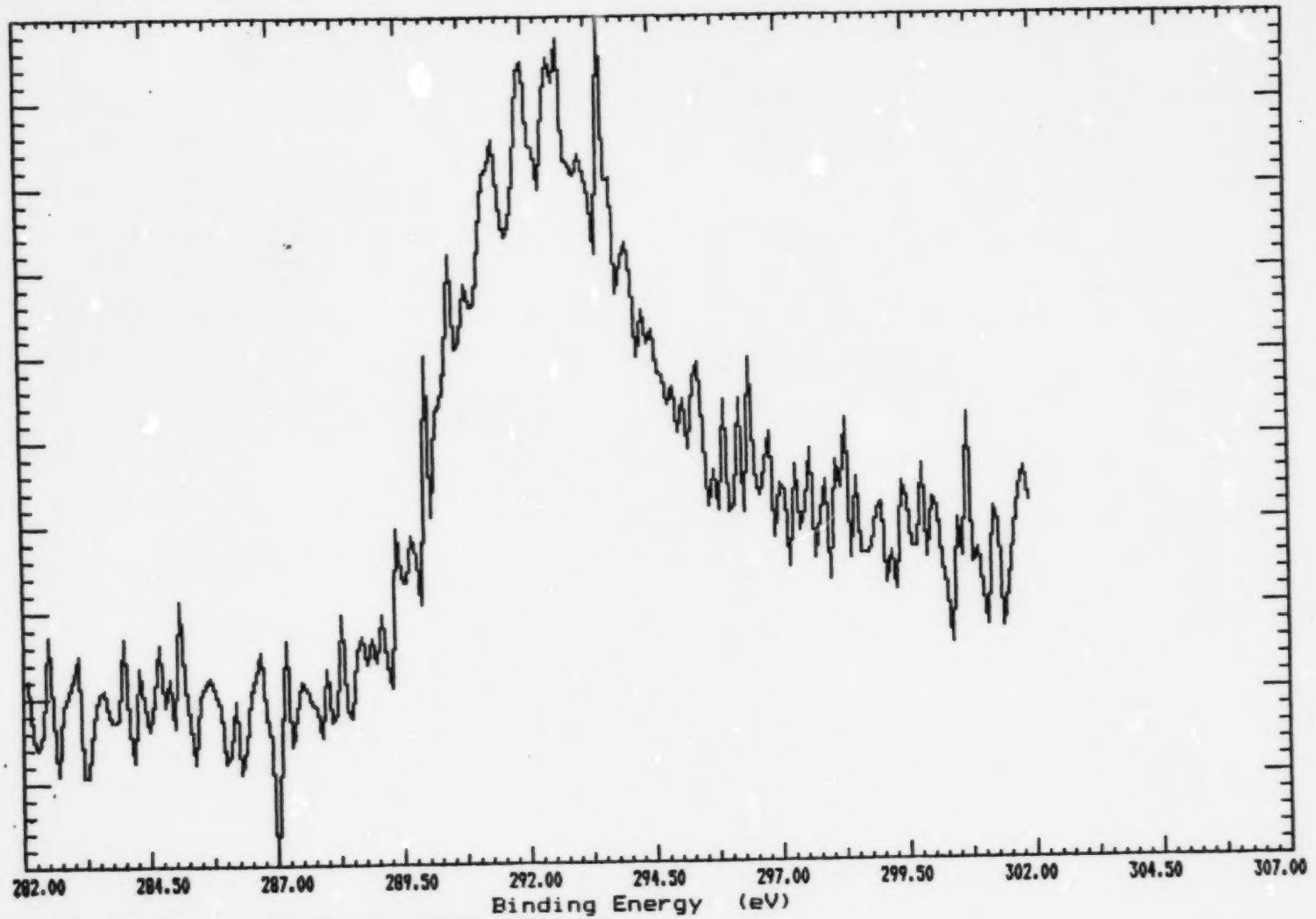
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 39183
Step Size = 0.10 eV. 15 Scans of 200 channels at 50 ms per chan



GL-4-180 REDUIT BROYE CM 15D/H MB300 NR
C1 OPT SI2P+MECA 2*10-7
8H45 17 MAI 90

ASA51 Region 5 C1S VG SCIENTIFIC

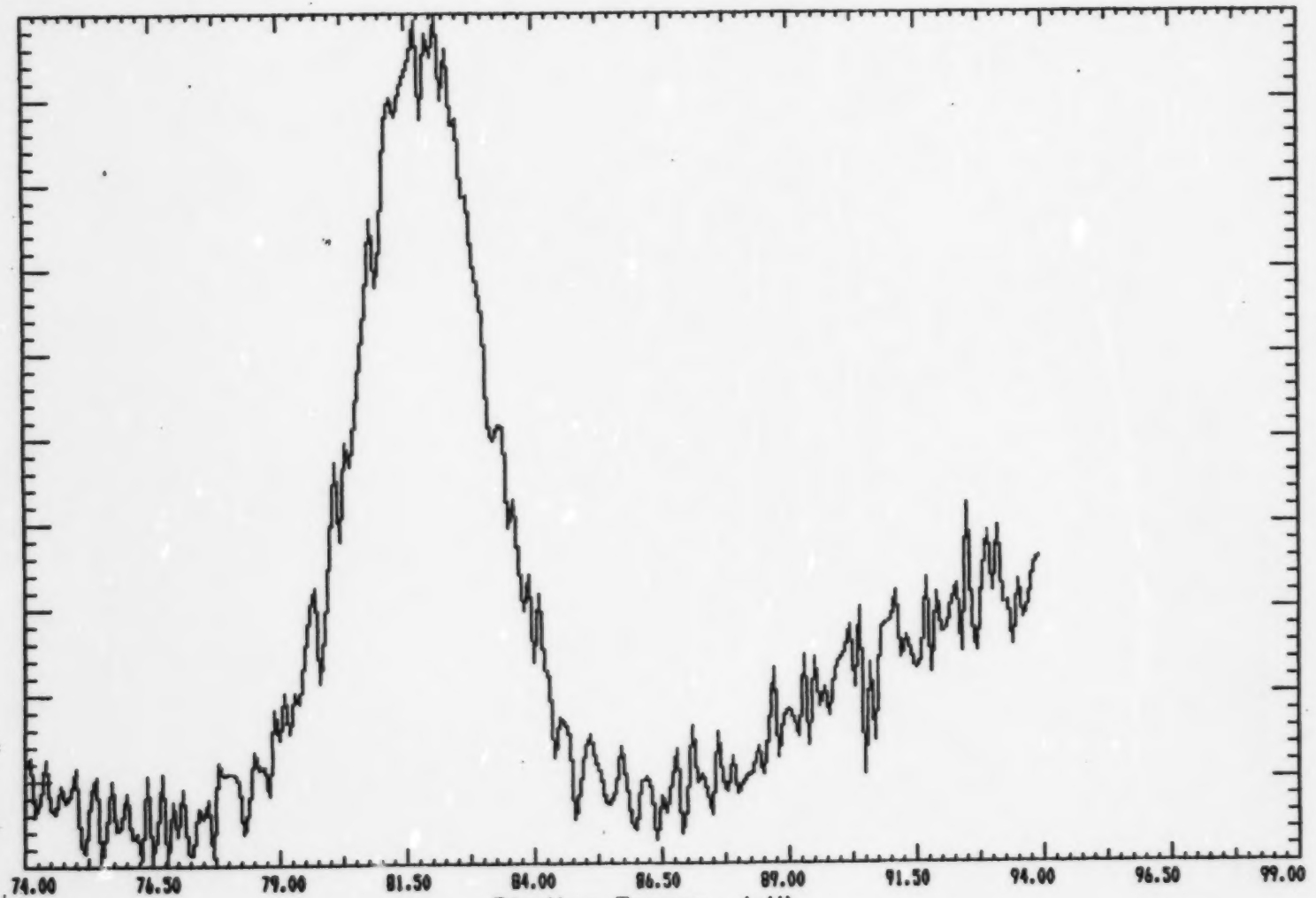
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 393
Step Size = 0.10 eV. 100 Scans of 200 channels at 50 ms per chan



GL-4-180 REDUIT BROYE CM 15D/H MG300 NR
C1 OPT SI2P+MECA 2*10-7
8H45 17 MAI 90

ASA51 Region 6 AL2P VG SCIENTIFIC

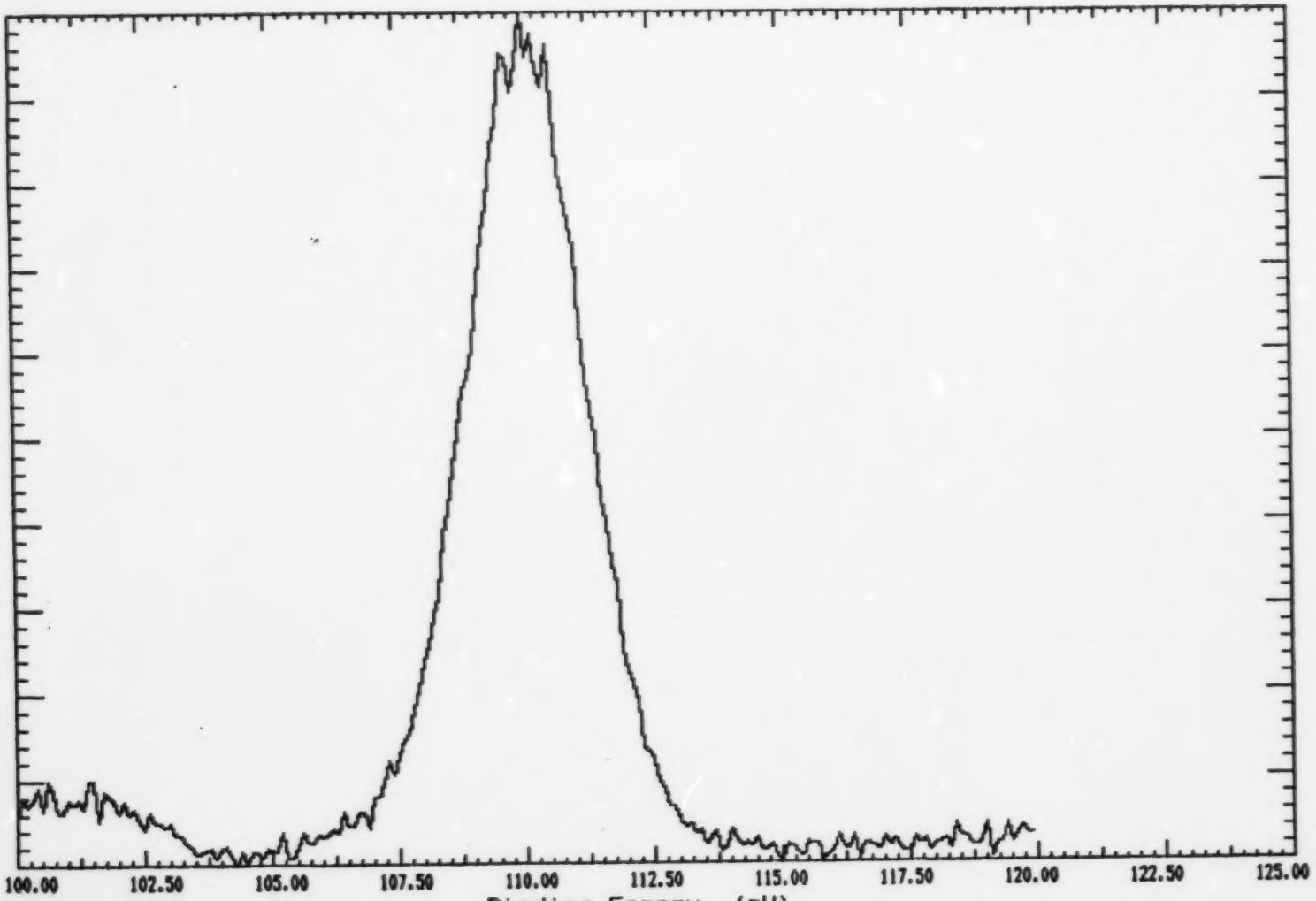
Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 334
Step Size = 0.10 eV. 100 Scans of 200 channels at 50 ms per chan



GL-4-180 REDUIT BROYE CM 15D/H MG300 NR
C1 OPT SI2P+MECA 2*10-7
BH45 17 MAI 90

ASA51 Region 7 SI2P VG SCIENTIFIC

Mg XPS Analyser Energy = 20 eV Max Plotted Count Rate = 7643
Step Size = 0.10 eV. 5 Scans of 200 channels at 50 ms per chan



GL-4-180 REDUIT BROYE CM 15D/H MG300 NR
C1 OPT SI2P+MECA 2*10-7
8H45 17 MAI 90